Annual Conference

of

Manitoba Agronomists

December 12 and 13

1939

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ANNUAL CONFERENCE OF MANITOBA AGRONOMISTS

held in the Board Room, University of Manitoba, Winnipeg, Thursday and Friday, December 12th and 13th, 1939.

President: Dr. G.F. Buckley,
Experimental Farm, Morden, Man.
Acting President: Dr. P.J. Olson,
Dept. of Plant Science, University of Man.
Secretary: Robt. Whiteman, Manitoba Department of Agriculture, Winnipeg.
Executive: A.C.Reise; Dr. C.H.Goulden.

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M I N U T E S.

TUESDAY, December 12th

The group met in the Board Room with Dr. Olson, Vice-President, in the chair.

As the minutes of the last Annual Meeting were contained in the Annual Report a motion was moved by Wm. Breakey, seconded by M.J. Tinline that minutes be adopted without reading.--------Carried.

The chair named the following committees:

Resolutions:	Nominations:
D. A. Brown	Wm. Breakey
D. M. McLean	Prof. J.H.Ellis
A. C. Heise	M. J. Tinline

After outlining the programme, Dr. Olson called upon Dr. Craigie (Acting-Chairman in the absence of Dr. Hanna) on Plant Diseases to take the chair.

Plant Disease Committee - Dr. Craigie - Chairman.

Papers submitted -

Root Rot Investigation - Dr. J.E. Machacek
Detection of Disease on Cereals - Dr. F.J.Greaney
Observation of Potato Disease - Mr. E. Howe
Giant Hill Disease of Potatoes - Mr. J.W.Scannell

Insects and Rodents Committee - Dr. R.D. Bird - Chairman.

Dr. Bird presented a paper on insect infecting Brome, Sweet Clover Weevil, Pill Bug infecting wheat and Wheat Stem Sawfly.

Soils and Fertilizers Committee - Prof. J. H. Ellis, -Chairman.

Discussion by J. Parker on work done at Melita. Prof. Ellis outlined work done in province with two kinds of fertilizer showing results of rate per acre.

Meeting adjourned for lunch in Manitoba Union.

Cereals Committee - W. H. Johnston, - Chairman

Papers submitted:

Early Maturing Varieties of Oats - J. Welsh
New Barleys - W. H. Johnston
New Barley Varieties Now on Trial - H. Laidlaw
Comparison of Regent, Renown, Thatcher, Apex - Dr. C. H. Goulden.
New Rust Resistant Varieties from U.S.A. - Dr. R.F. Peterson
Progress Report on Durums - W. H. Waddell

Grain Grading Committee - Prof. T.J. Harrison, - Chairman

Papers submitted:

Taints on Wheat - Prof. T. J. Harrison
Findings on Melilot Taint at Brandon - M.J.Tinline
Corn Grading and Handling - W. S. Frazer

The Manitoba Agronomists met with the C.S.T.A. for a Dinner in Princess Tea Room. Mr. John Walker presided. Some ninety attended. President S.E. Smith, University of Manitoba; Mr. R. England; and Mr. L. W. Brockington, K.C., gave short addresses.

WEDNESDAY, December 13th

Weed Committee - George Batho, - Chairman

Papers submitted:

Mr. Batho showed a number of pressed weed specimens.
Observations on Control of Leafy Spurge - D.A. Brown
Results of Leafy Spurge - T. L. Townsend
Eradication of Dandelion - Dr. P.J. Olson
What Can Agronomists Do About Weeds? - C.S. Prodan

Report Seed Grading Committee - A.C. Heise - Chairman

Papers submitted:

Report on New Regulations re Forage Crops under C.S.G.A. - F. L. Dickinson
Summary of New Regulations under Seeds Act - J.E.Blakeman
U.S.A. Federal Seeds Act for 1940 - A.C. Heise

Report on Extension and Publicity - R.D. Colquette. - Chairman

Papers submitted:

Paper on Suggestions for the Extension and Publicity of Material to Growers - R.D. Colquette

Forage Crop Committee - Wm. Breakey, - Chairman

Papers submitted:

Silos - T. A. Johnson
Pasturing Corn - T. A. Johnson
Discussion on Corn - Led by Dr. H. Sommerfeld
Hybrid Corn Breeding Programme - A. C. Ferguson
Artificial Tripping of Alfalfa - Dr. P. J. Olson

Adjourned for lunch at Manitoba Union.

Cereal Committee - W. H. Johnston, - Chairman

D. M. McLean discussed Variety Zone Changes for Manitoba. Following this Mr. N. Young, Ottawa, was called on to discuss Fibre Flax Seed Distribution. After considerable discussion it was recommended that a small amount of seed be made available for experimental purposes in Manitoba especially on Dominion Illustration Farms.

Farm Management Committee - J. Racine, - Chairman
Papers submitted:
Farm Tillage Problems at Melita - A.J.Strachan
Leafy Spurge from a Farm Management Standpoint - T. L. Townsend
Practical Application of Farm Management - R.D. McLean
Report of Committee on Resolutions - D.A. Brown, - Chairman

Resolution No 1 - D.M. McLean; T. Pickersgill
WHEREAS the seed producers of Manitoba have no representative on the Advisory Board under the Seeds Act and
WHEREAS formerly they were so represented in the person of the late P. M. Mountain of Solsgirth and
WHEREAS the problems peculiar to seed production in Manitoba are worthy of greater consideration therefore
BE IT RESOLVED that the Honorable the Minister of Agriculture for Canada do now so appoint a Manitoba Grower Representative to the Advisory Board.---------Carried.

Resolution No. 2 - D.M. McLean; J. Racine.
WHEREAS in recent years the regulations under the Dominion Seeds Act have been put into effect during the season of movement of seed crops from the farm into commercial channels and
WHEREAS these changes in many cases made a change in the grade of a lot of seed to the financial loss of the producer and the dislocation of trade
BE IT RESOLVED that the Advisory Board under the Seeds Act be requested to prepare revisions of such regulations for printing and distribution prior to September first in each crop year.---------Carried.

Resolution No. 3 - A.T. Elders; J.S. Welsh.
Moved that the Manitoba representatives on the Zonation Committee of the Western Society of Agronomy bring the changes in the Cereal Zone Map and nomenclature of this committee with a view to having them incorporated in the Western Cereal Zone Map.--------Carried.

Resolution No. 4 - D.A. Brown; D. Peterson.
RESOLVED that the Manitoba Agronomists tender a hearty vote of thanks to President Smith of the University of Manitoba and Dean Mitchener of the Faculty of Agriculture for their courtesy and assistance in making available the facilities of the University for the meetings.---------Carried.

Resolution No. 5 - D.A. Brown; A.T. Elders.
RESOLVED that the Manitoba Agronomists express their thanks to the C.S.T.A., Winnipeg Branch, for the Dinner and excellent programme to which they were invited.------Carried.

Resolution No. 6 - J.N. Welsh; D. Summerfeld.
RESOLVED that we extend our very best wishes to our 1939

President, Dr. C.F.H. Buckley, who during his tenure of office was appointed to the staff of the Dominion Experimental Station at Harrow, Ont., his removal thereto necessitating his absence from the chair at our 1939 meetings.-------Carried.

Report of Nomination Committee - (Officers Proposed for 1940)

President	- P.J. Olson
Vice-President	- A.C. Heise
Secretary	- R. Whiteman
Executive	- W.H. Johnston
	- J.R. Racine

COMMITTEES

(first named chairman of each committee)

Cereals - R.F. Peterson; J.N. Welsh; D.M. McLean; H.C. Laidlaw; F.L. Dickinson; T. Pickersgill; W.H. Johnston;

Forage Crops - W.J. Breakey; J. Crawford; W.H. Nelson; H.B. Sommerfeld; T.A. Johnson; W.S. Frazer; Dr. P.J. Olson.

Grain Grading and Seed - Prof. T.J. Harrison; A.T. Elders; J.E. Blakeman; T.R. Aitkens;

Plant Diseases - Dr. J.H. Craigie; Dr. M. Newton; Dr. J.C. Machacek; Dr. F.J. Greaney; E.J. Howe; J.W. Scannell.

Weeds - George Batho; T. Townsend; A.J. Strachan; W.H. Silversides; C.S. Prodan; D.A. Brown.

Insects and Rodents - Dr. B.D. Bird; Dean Mitchener; H.E. Wood.

Extension and Publicity - R.D. Colquette; N.C. Mackay; George Batho; W. Mathers.

Farm Management; - Dr. H. Sommerfeld; N. J. Siemens; A.I. Judson; T. Townsend; J. Racine; S. Tallman.

MEMBERS PRESENT AT THE MANITOBA AGRONOMIST CONFERENCE

T.J.Harrison	F.L.Greaney	F.L.Dickinson	C.L.Johnston
W.J.Mathers	Jas.A.Good	Geo. Mason	W.H.Nelson
J.N.Welsh	A.C.Ferguson	Hon.D.L.Campbell	E.Robertson
C.S.Prodan	B.Peterson	M.T.Sym	W.E.Sallens
J.E.Blakeman	N.C.MacKay	Thos. O.Graham	A.Wilton
W.J.Breakey	John Walker	A.E.McLaurin	G.G.Elias
T.C.McBeath	J.D.Arnold	J.H.Ellis	T.A.Johnson
J.Racine	M.G.Shillington	P.J.Olson	E.G.Minielly
T.B.Pickersgill	N.J.Siemans	D.Guravick	A.C.Heise
H.E.Wood	C.Nichol	H.C.Laidlaw	E.C.Martin
T.L.Townsend	W.W.Casson	John Parker	H.B.Somerfeld
W.H.Waddell	Ian Casson	R.B.Stevenson	John Norquay
R.F.Peterson	K.D.McLean	J.H.Craigie	J.Crawford
M.J.Tinline	A.J.Lajeune	Frank Anderson	Dr. Goulden
W.H.Johnston	George Batho	W.R.Byers	J.LaFrance
D.A.Brown	Donar J.Gorby	W.E.Kroeker	R.Colquette
A.J.Strachan	A.Lorne Shewfelt	E.Jay Watson	
Jas.Meredith	A.T.Elders	D.W.Richmond	

PLANT DISEASE COMMITTEE

Chairman - W.F. Hanna

Members - Margaret Newton, J.E. Machacek,

F.J. Greaney and E.T. Howe

Owing to the absence of the Chairman, Dr. Hanna (now on military duty), the Secretary requested Dr. J.H. Craigie to act in his place. The following report was presented. The name of the person responsible for the information contained in each item is indicated.

Oat-Smut Survey, 1939

During the past summer, a survey of the prevalence of the oat smuts in Manitoba was made. In the survey, 121 fields of oats were examined. These smuts were less prevalent in the north-western part of the province than elsewhere. This area included most of the fields in which smut infection ranged from a trace to one per cent, embracing 41.4 per cent of the fields examined. The average per cent of smut in the 121 fields was 4.4 per cent; in 80 of these fields the average was 6.6 per cent. On the basis of 4.4 per cent smut, the loss this year would be in the vicinity of 2,500,000 bushels, which at 40 cents per bushel would amount to $1,000,000. - Wm. Popp.

Damage from Cereal Root Rots, 1939

Three types of cereal root rots were observed in Manitoba during 1939. Take-all was found in the Swan River Valley, and Browning root rot in the area between Brandon and Rapid City, but both apparently did very little damage. Common root rot, however, was found in every field of wheat examined.

The annual loss in yield due to common root rot has been previously estimated to be about a 5 per cent. An attempt was made in 1939 to verify the correctness of this estimate. A number of samples of ripe plants were gathered from fields in individual soil zones - 23 samples from A2 and 10 from each of the other soil zones. The prevalence of root rot in each sample was correlated with the weight of threshed grain from that sample. These data showed that the average loss from common root rot in common wheat

was 7.47 per cent. In soil zones A1 (dark brown steppe, black earth transition) and A5 (degrading black earth and grey wooded), the loss was about 11 per cent. The least damage was in zones A3 (northern black earth and degrading black earth) and the eastern part of A2 (black earth), where the loss was only 5.5 per cent.

It may be pointed out that the development of common root rot was considerably retarded by the low spring temperatures, otherwise the damage might have been greater. - J.E. Machacek.

Newer Farm Practices in Relation to Plant Disease

Attention should be called to the fact that the use of some of the modern farm implements may increase disease damage to cereal crops. During the present year two instances of this have been observed.

1) The use of the narrow-cut swather has evidently lead in many cases to moldiness of straw and grain. It was noticed that the coil of heads left by the swather was too small to rest on top of the stubble, so that it was easily beaten down to the ground by rain, where it readily became overgrown by mold. To prevent this condition and to permit the pick-up combine to gather the grain, it was necessary to raise the coils of heads by hand before the combine could operate properly. - E.T. Howe.

2) The prevalence of yellow leafspot of wheat (Helminthosporium tritici-repentis) in Manitoba during 1939 suggests that the widespread use of the one-way disc is partly responsible for the epidemic of this disease. The fungus hibernates on infected stubble and straw, and if this straw is exposed on the soil surface, large numbers of fruiting bodies are formed. It is thought probable that the majority of plant infections arise from this source, and that such infections could be prevented if the infected plant residue was buried by the plow. - J.E. Machacek.

Determination of Seed-borne Diseases in Cereals

The detection of diseases on seeds of small grain crops has been carried on at the Dominion Rust Research Laboratory for three years. Laboratory methods of indexing wheat and barley for smut, seedling blight, root-rot, barley stripe, and other seed-borne diseases have been developed. The main objects of the work are to determine both the viability and pathological condition of the seed and to obtain information each year on the condition of the seed stocks in Manitoba in order that definite recommendations concerning seed treatment can be made.

In 1936 and 1937, it was found that in a few crop districts of Manitoba (Swan River, Gilbert Plains and Selkirk) infection of the seed of wheat and barley with the seedling blight and root-rot fungi was sufficiently severe to justify seed treatment. In these years the district representatives of these areas were informed of the situation. This year a more intensive seed survey of Manitoba was made. The results obtained so far indicate that the seed stocks in certain districts (South-western and Eastern Manitoba) are relatively free of disease-producing organisms. A clean bill of health could be given to the seed stocks of wheat and barley in these districts. In others, however, particularly Swan River and Winnipeg districts, farmers would be well advised to treat their seed owing to the rather high percentage in seed lots of kernels infected with disease-producing fungi. - F.J. Greaney.

Observations on Potato Diseases

Wilt has been the most important single disease this year; practically every field in the Province being infected to some extent. In fields of Certified Seed potatoes, the District Inspector, Mr. Scannell, reports that of the sixty-six fields rejected, fifty were rejected on account of Fusarium wilt. Largely due to this disease we have the unique situation in Manitoba this year of there being no Certified Seed potatoes of local origin available. Mr. Scannell suggests that the hot, dry conditions prevailing in July followed by the warm, wet weather of August produced an environment of high humidity which in turn proved ideal for the spread of this parasite.

Bacterial Wilt and Rot, caused by Phytomonas sepedonica, made further advances in the Province. Two fields were reported at harvest time, both at Bird's Hill. Undoubtedly there were other points of incidence, as it can be easily overlooked in a field, especially when the plants are maturing, or it may pass for wilt of fungus causation unless examined by one familiar with the symptoms.

In brief, typical symptoms are primarily a rapid and complete wilting of the haulms late in the season. Secondarily, the tubers when cut across are flaccid and considerable areas of the flesh are greyish in colour initially, or brownish in more advanced cases. The medullary ring is dark brown and finally an externally visible, black lesion develops progressively from the stem end. The disease has been widespread in Southern Alberta this year. It was reported last year for the first time in Manitoba in one patch in St. Andrews Municipality which was in no way connected with the occurrences this year. The stock from which the patch in St. Andrews arose had been imported from a Maritime source in the spring of 1935.

The 1939 crop season has been fairly free of other fungus and bacterial diseases of potatoes as also of most of the virus diseases except Mosaic. It is a matter of note, however, that Mr. Scannell's disease report shows the occurrence of "Giant Hill" for the first time in Manitoba. It occurred in a single field of "Early Ohio" east of Winnipeg. - E.T. Howe.

INSECTS AND RODENTS COMMITTEE

The Sweet Clover Weevil (Sitona cylindricollis Fahr.)

by Dr. R. D. Bird and W. R. Allen

The sweet clover weevil suddenly occurred in large numbers all over Manitoba in 1939. No reports of damage were received in 1938 and no previous outbreak of this insect has been recorded in the prairie provinces.

Distribution

This insect was introduced from Europe and was first recorded in Canada in 1927. It was found severely injuring young sweet clover at Middlebury, Vermont, in 1932 and at that time was known to occur on the New York side of Lake Champlain valley and at Storrs, Connecticut, and Amherst, Massachusetts. In 1936 it was found distributed throughout Ontario from Ottawa to Windsor and from southeastern Ontario to Georgian Bay. The extent of occurrence led Goble to believe this weevil of European origin and that it must have been in this country for twenty years.

Importance and Type of Injury

The adult Sitona beetles can be responsible for severe foliage damage to sweet clover and in severe infestations strip the bark from the stems and branches. When a new seeding of sweet clover is attacked, damage may be so complete as to leave only the bare stems. Seed production suffers severely from the depredation of this insect and may be reduced by more than 50%. This unthriftiness of the plant is caused by defoliation of the adult beetles, aided by the larvae which feed on the fine roots and root hairs.

Plants Attacked

Sweet clover is the favorite food. Alsike clover is much less attacked while alfalfa and other legumes, such as redclover, seem to be immune.

Life History

Sitona cylindricollis is known to overwinter in the adult stage which was hibernating in Ontario under plant refuse, in long grass on headlands, inside old corn stubble, in cracks in fence rails, and under the loose bark of cedar posts. In Manitoba (September 12, 1939) adult beetles were located beneath clover trash and hidden in cracks in the soil in a relatively inactive state. At the same time the beetles were migrating from a granary into which they had been placed with threshed seed.

In Ontario the beetles became active in the spring a few days after the maximum temperature had reached 64 degrees F. (April 30). Mating began one to two weeks after emergence from hibernation and eggs were found shortly after in cages. Observations show the eggs are laid indiscriminately on the surface of the soil. In Russia the eggs are also laid on the surface of the soil. Maximum oviposition occurs there in May and egg production in some females reaches 1,000 eggs.

The larvae are typical curculionid larvae and average 5 millimetres in length when full grown. They feed on the fine roots

and root hairs but when they are not excessively numerous apparently do little damage.

Pupation in Ontario occurred June 20 and the first of the new adults were seen June 25. Fifteen days were estimated as the duration of the pupal stage. The adults kept emerging until well into August and feeding continued into October.

Control

Natural Control is an important factor. In Ontario following the outbreak of 1935 there was a very marked reduction in 1936 and the insect has not again been important. The causes of the decrease are not known but are possibly due to dryness and hardness of the soil and predators. No indication of disease was seen (Goble Rept. Ent. Soc. Ont. 1936).

Applied Control. Goble tried a number of arsenical sprays and dusts without success. A dust of barium fluosilicate and talc, equal parts, apparently gave commercial control.

Goble suggests cutting the clover for hay in the early blossom stage, ploughing the stubble which should kill many larvae and pupae. He was unable to try this out but it would appear to be a good practice in Manitoba.

In Russia the destruction of weeds and trash about the fields which serve as hibernating quarters is recommended together with early spring discing.

The Clay-Colored Billbug (Calendra aequalis Gyll)

by Dr. R. D. Bird,

The clay-colored billbug appeared in economic numbers in Manitoba for the first time in July, 1939. The infestation occurred in an area of a few acres about 6 miles north of Pilot Mound. Other Canadian records are "Damaging Corn at Grimsby, Ontario, 1935 (R.W. Sheppard)" and "Feeding on Grain near Melfort, Saskatchewan, 1938 (L.C. Paul)". In the United States the species occurs from the international boundary to Arizona and eastward to the Atlantic coast. The insect chiefly attacks corn and millet which fields it invades from its native hosts, rushes, sedges and reeds. The larvae tunnel in the tuberous roots. The adult is a thick-set gray beetle with two longitudinal whitish stripes. It is about one-half inch long and has a well developed beak at the end of which the chewing mouth parts are situated.

At Pilot Mound the beetles attacked wheat when it was heading and to a lesser extent barley. At first they bit through the sheath above the upper node, severed the stem and caused the head to turn white. Later when the kernel commenced to form they attacked it. They are very sluggish insects and remain clinging to the wheat with the bill inserted in the wound. They can easily be collected and destroyed by knocking them off into a pail. One farmer collected three syrup pails full in an evening. The infestation occurred near a small marsh which had completely dried up. Many tubers of aquatic plants were found but at the time they were dead and contained no beetles or their larvae. It is quite probable, however, that the infestation originated there.

As the insects originate in marshy areas it is not probable

that they will become a serious pest in Manitoba although they may do some damage to farms immediately adjoining marshes or on reclaimed marsh land.

In the United States (Farmers' Bull. No. 1003, U.S.D.A.) control is obtained by suitable systems of crop rotation in which corn is not grown more than two years in succession and by the growing of immune crops, such as flax, soybeans and potatoes.

The Wheat Stem Sawfly (cephus cinctus Nort.)

By Dr. R. D. Bird,

This sawfly is a native insect which breeds in a number of tall grasses, particularly Agropyron and Elymus. Of cultivated plants attacked wheat and spring rye are particularly susceptible. Fall rye, although attacked, matures too early to suffer much injury. Barley, owing to its quicker growth and later date of sowing, also escapes the main attack. Oats are immune.

Serious losses by the sawfly were suffered in Manitoba from 1915 to 1925. Since then it has been of relatively little importance. Apparently its abundance at that time was associated with the prevalence of Marquis wheat which is particularly susceptible. Durums, which were grown more abundantly later, are not so subject to attack. Brome grass, too, which has become abundant on headlands and road allowances in many districts is a natural trap crop as sawflies lay in it but only a few larvae mature. H. J. Kemp (Sci. Agric. 1934, pp.30-38) has shown that there is a definite relationship between the solid stem nature of certain wheats and their immunity to sawfly attak. The newer rust-resistant wheats are more subject to sawfly attack than the Durums. With the increase in acreage of these wheats the adoption of strip farming methods in the southwest and the abundance of couch grass, a favorite host, we find the sawfly again becoming a problem in Manitoba. Losses up to 5% were noted this year along our western boundary. Every effort should be made to prevent the sawfly from again becoming a serious pest. The following control measures are recommended:

1. Trap Crops:

(a) Permanent trap crops of brome grass to be planted on headlands and road allowances.

(b) Temporary trap crops of early seeded wheat or spring rye to be planted in the stubble between the strips of a strip farm. These traps should be cut for hay before July 15. A strip of cleanly cultivated land 10 feet wide between the trap and crop increases the protection.

2. Avoid "stubbling in".
3. If possible, plough all infested land with a mouldboard plough.
4. Rotate with immune crops, such as oats and flax.
5. Destroy or mow all couch grass before July 15.

SOILS AND FERTILIZER COMMITTEE

Rod Row Commercial Fertilizer Trials
By W. H. Johnston

Rod row commercial fertilizer trials have been conducted at the Brandon Experimental Farm for the past seven years. Plots consisted of four rows, spaced one foot apart with yields being determined on the centre two. All treatments were carried out in quadruplicate. Except in the experiment dealing with rates of application, ammonium phosphate (11-48) alone was applied with the seed at the rate of 50 pounds per acre. During the period 1933-1936 Ceres wheat was used, and for the past three years Ronown. All of the work thus far has been limited to a light sandy soil with gravelly subsoil, characteristic of the higher land on the Experimental Farm.

A study of the results year by year leads to the following observations:

1. Fertilizer response in the different years of the test, while showing considerable fluctuation, may be summarized on an acre basis roughly as follows:
1933 - 1 bus; 1934 - 1.5 bus: 1935 - 3.5 bus: 1936 - 5 bus: 1937 - 3 bus: 1938 - 2.5 bus: 1939 - 4 bus:
The average yield increase from use of fertilizer for the seven-year period was between 2.5 and 3 bus. per acre.

2. In the early part of the growing season of most years comparatively large differences in growth existed in favor of the fertilized plots. As the season advanced these differences tended to disappear due mainly to heat damage in July. In 1937 and 1939 increases in yield from fertilizers were offset by a lowered test weight indicating that the increased vegetative growth of the plants, resulting from fertilizer, placed them at a disadvantage at time of filling.

3. The results are fairly conclusive that higher responses from fertilizer may be expected from seeding before May 1st than after that date.

4. Indications are that greatest responses from fertilizer would more often be expected from light rates of seeding grain than from the heavy rates.

5. With respect to depth of seeding the only conclusion that can be drawn is that the 2- and 3-inch depth of seeding usually practised is as satisfactory as any other depth for bringing out the beneficial effects of fertilizer.

6. A comparison of ammonium phosphate and triple superphosphate fertilizers showed no difference in their ability to increase yields.

7. The 30 and 40 pound per acre applications of both ammonium phosphate and triple superphosphate gave consistently as high returns as the 75 and 100 pound applications.

Progress Report of Fertilizer Experiments at the Dominion Reclamation Station, Melita.
By J.A. Strachan

In the spring of 1936 a set of 45 plts, each 5/8 of an acre in area was laid down at the Reclamation Station, Melita. The

first usable records were taken from the 1937 crop. They were located so as to include average soil, soil severely eroded and sand banks. A three year rotation of "summer-fallow", "wheat," "wheat", was established and the following fertilizer used: - ammonium phosphate 11-48 at 40 lbs. per acre, ammonium phosphate 16-20 at 100 lbs. per acre, triple superphosphate at 45 lbs. per acre, barnyard manure at 12 tons per acre, and check plots. The manure was applied in the summer-fallow year only, while the fertilizer was applied for each of the grain crops.

In 1939 a fertilizer test on corn was established to determine the kind of fertilizer, rate of application and placement best suited for corn.

Greenhouse trials at Brandon have also been made to determine the residual effect of fertilizers on the soil from the plots at Melita, and to test the effect of fertilizers on soil from "blow out" areas.

Results and Observations from these tests:

The following table shows the average yield peracre from triplicate 5/8 acre plots at Melita 1937-39 inclusive:

	Wheat after Fallow				Second Crop Wheat			
Treatment	1937	1938	1939	Av.	1937	1938	1939	Av.
Manure	19.50	16.53	20.41	18.81	11.50	9.86	10.19	10.52
A.P. 11-48	17.10	15.20	20.20	17.50	11.30	10.66	10.61	10.86
T.S.P.	17.7	14.93	18.10	16.91	11.20	10.66	8.01	9.96
Check	16.7	12.80	16.68	15.39	11.20	9.33	9.18	9.90
A.P. 16-20	14.2	13.33	15.36	14.30	10.49	9.87	12.14	10.83

Observations:

1. Barnyard manure has given the best results on this type of soil.
2. Ammonium phosphate 11-48 has given the best results of the commercial fertilizers. Triple superphosphate also gave a fair increase in yield.
3. Ammonium phosphate 16-20 has given very poor results and is evidently not a suitable fertilizer for this area.
4. Fertilizers gave increased yields on summer-fallow land but with second crop the benefit from fertilizer is very slight.

Effect of Fertilizer on Corn at the Melita Station:

1. Manure gave an increase in grain yield of corn amounting to 18 bushels per acre.
2. Ammonium phosphate 11-48 also gave a marked increase in yield, the 200 lb. application being almost as good as manure but it proved costly.
3. Fertilizer applied with the seed injured germination very severely and a very poor stand resulted.
4. Placing the fertilizer below the seed gave higher yields than when it was placed in bands beside the seed.
5. Ammonium phosphate 16-20 did not give as good results as 11-48 but was superior to triple superphosphate.

Greenhouse Trials to Determine the Residual Effect of Fertilizer:

Composite soil samples were taken from the plots at Melita which had been fertilized for the previous crop and wheat was grown on this soil without further additions of fertilizer.

Soil and Treatment	Av. length of Straw	Av. length of Head	Av. yield in bus. per acre
Eroded soil - check plots	25.0	1.58	10.51
" " - manure plots	25.3	1.66	13.17
" " - A.P.16-20 (100lbs/ac)	22.6	1.31	8.81
Good soil - check plots	25.8	2.04	17.28
" " - manure plots	28.1	2.08	24.17
" " - A.P.16-20 (100lbs/ac)	28.3	2.04	21.88

The barnyard manure gave increased yields on both the eroded and good soils showing that there was some residual effect from it. The ammonium phosphate 16 - 20 showed a decrease in yield with the eroded soil and a slight increase with the good soil. It is doubtful if there is any residual effect from this fertilizer.

Results of Fertilizer Treatment of Eroded Soils:

Samples of soil were taken from severely eroded areas and various fertilizer treatments applied in the greenhouse to determine the effect of each on crop yields:

1. Manure gave remarkable increases in yield on these soils. On soil from an eroded area on the Melita Station the check yielded 7.6 bus. per acre and the manure treatment 21.5. On a more severely eroded soil from a "blowout" west of Melita the check yielded .92 bus. per acre and the manure treatment 25.5.
2. Barnyard manure produced considerable increase in length of head and length of straw.
3. The ammonium phosphate gave very slight increases in yield, amounting to about 2 bushels per acre and no increase in length of head.

Summary:

1. Manure gave the greatest increase in yield in every test.
2. The result from barnyard manure would indicate the need for additions of organic matter to this type of soil, especially severely eroded soils.
3. Ammonium phosphate 16-20 has proven to be of little value on this type of soil.
4. Fertilizer cannot be safely applied with the seed when fertilizing corn.

GRAIN GRADING COMMITTEE

Taints on Wheat and their Effect on Grade
(by T. J. Harrison)

Contrary to the general belief, wheat is quite receptive to various taints or odors. The odor may be carried by the active agent, as in smut spores, or may permeate the whole kernel, as in melilot taint. In each case the odor is usually carried over into the flour and finally into the bread. The value of wheat so affected will depend upon the objectionableness of the odor and the means, if any, of removing it. This makes it necessary to segregate the wheat according to odor and designate it by some grade name. Under the Canadian grading system it is designated as "Rejected" with the grade name to which it would otherwise belong and a prefix, or suffix, indicating the cause of the odor. The most prevalent taints, or odors, are caused by smut, fire-burnt grain, tar products, kerosene products, weeds and sweet clover.

SMUT, stinking smut or bunt is one of the most common and best known odors with which wheat may be contaminated. The odor has been compared to that of decaying fish and is most objectionable. Fortunately it does not permeate the kernel and if the smut spores are removed the odor is eliminated. Thus wheat which is washed or scoured is almost equal to smut-free wheat for milling. The spread in price between smutty and clean wheat is therefore comparatively narrow, amounting to about six to eight cents per bushel. This amount is accounted for in the extra cost of segregating, cost of washing and the lowered value because of the wetting and drying. Because of the prevalence of smut the specific word "smutty" has been substituted in the grade name for Rejected. Thus, for example, No. 1 Manitoba Northern so contaminated is graded "Smutty No. 1 Manitoba Northern".

BURNT GRAIN. When a granary, elevator or car burns much of the wheat is usually salvaged. This grain has a distinct smoky and burnt odor which is quite objectionable to both the miller and feeder. While aeration will reduce the intensity of the odor to some extent, it still clings to the kernels. About the only means of utilizing the grain is as feed for live stock. Because of this, the price spreads are much wider than in "smutty" grain and may range from ten to fifteen cents per bushel. Grain so affected is graded Rejected with the suffix "a/c fire-burnt". For example, No. 1 Manitoba Northern would be graded "Rejected No. 1 Manitoba Northern a/c fire-burnt".

TAR. Tar and certain tar products will give the wheat a "tarry" odor. A complaint was received a few years ago from Germany that a cargo of Canadian wheat had a distinct odor of tar and was quite objectionable. The grain had been shipped from a Canadian port to Rotterdam, transhipped to barges and taken up the Rhine to Mannhiem. The millers claimed it had a distinct odor of tar and refused to unload it. The cargo sample at Montreal was examined and found to contain no odor. It was then assumed that either the hold of the vessel or the barge had contaminated the grain. It is possible that some timber treated with tar might have been shipped in the same hold. The Board

has had some trouble with shipments out of Vancouver where untreated timber was placed on top of the grain. In all of these cases the odor has been transmitted to the grain and has lowered its value for bread making.

KEROSENE. The odor of kerosene, gasoline, distillate, etc. is readily taken up by wheat. There is always danger of contamination in the use of cars that have been used in this trade. An interesting case comes to mind of where a farmer was using as a fuel on his threshing outfit, kerosene. He placed what was purported to be an empty drum on the grain truck. The drum was not empty and a quantity of the kerosene ran into the wheat. The grain was loaded into a car and the whole carload was "Rejected a/c kerosene".

APPLES. Apples have not an objectionable odor but one that is quite penetrating so far as wheat is concerned. Some few years ago the Board of Grain Commissioners received several complaints from overseas millers that certain cargoes were contaminated with an apple odor. The investigation showed that there had developed a practice in Atlantic shipping of placing barrels and boxes of apples on top of the wheat in the different holds. This practice was stopped and no further trouble was experienced.

WEEDS. Certain weeds have distinctive odors that may be taken up by wheat in threshing, or in storage. The two most common are false ragweed and poverty weed. Fortunately the former only grows around the edges of the fields and the latter is not very prevalent. The odor apparently does not diffuse as readily as some others. The result is that while a few truck loads may be contaminated it can be mixed off in clean wheat without much danger of contaminating the whole lot. Consequently, it does not often appear in carload shipments. When it does the grain is graded "Rejected a/c Poverty Weed odor".

MELILOT. Melilotus is a group of leguminous plants characterized by a strong, sweet penetrating readily diffusable odor. The two most common plants in this group are White Sweet Clover (Melilotus alba) and Yellow Sweet Clover (Melilotus officinalis).

British and Irish millers have been cognizant of melilot taint for many years, and are suspicious of wheat from certain countries, particularly Russia. Until recently Canadian wheat has been free from this defect. The first indication that our wheat might be affected was in 1932, when a milling company in Eastern Canada complained of sweet clover odor in a carload of wheat shipped direct from the West, but owing to considerable doubt as to the source of the contamination the matter was dropped. In 1936 the Liverpool Corn Trade Ass'n complained that a cargo of wheat from Canada was so affected. The Board of Grain Commissioners immediately instructed the Dominion Grain Research Laboratory to investigate the seriousness of this taint. The laboratory made a series of tests at that time, and has repeated and extended the work during the past few months. The results of the investigation are summarized as follows:

"Melilot taint persists in bread made from wheat having a strong and unmistakable odor. With such wheats the odor is readily detected in all milled products, when the dough is mixed and during fermentation. The odor of the bread is faint, but can be detected by experienced observers; some also find that the bread tastes of melilot. The taint tends to persist more strongly in whole-wheat bread than in white bread.

Melilot odor is considerably less strong in patent flour than in the wheat from which it is made, and is still fainter in bread, in which its presence is masked by other odors produced during fermentation and baking. Thus wheats having only a faint melilot odor generally produce bread which is indistinguishable in odor and taste from that made from untainted wheat. However, even with faintly tainted wheat the melilot odor can be detected in the milled products, and this may give rise to legitimate complaints by customers".

On the basis of the laboratory tests, further complaints from overseas, and the necessity of maintaining the quality of Canadian wheat on the United Kingdom market, the Board of Grain Commissioners decided that wheat so contaminated should be segregated at the terminals, and then handledand sold separately. Therefore in 1937 the Board instructed the Inspection Branch to grade all wheat with this odor "Rejected to the grade to which it would otherwise belong".

In 1938 only a few cars with a very strong odor were rejected. In that year many more complaints were received from the United Kingdom millers who stated thatif the Board persisted in allowing this taint in the straight grades they would have to use wheat from other sources. The result was that the inspection for this contamination had to be made more rigid, and in the 1939 crop up to September 15th over one hundred cars were rejected. While this is a comparatively small percentage of the total western wheat crop, it creates a serious problem for the individual farmer who has his wheat rejected. According to the Canadian Wheat Board, wheat rejected for melilot taint sells at a discount of 11¢ under the straight grade. In other words, on an average sized car the loss is from $150.00 to $175.00.

Since most of this taint originates on Manitoba wheat, the Board requested a committee be set up in that province to make a study of the cause with a view to evolving a remedy. Mr. Tinline has done considerable work on this problem and will now report his findings. Dr. Olson and Mr. Breakey have also conducted work on the threshing and it is suggested they discuss their work in the light of Mr. Tinline's findings.

Investigations Re Melilot Taint on Wheat

By M. J. Tinline

Following up the request that some investigational work be undertaken to determine the sources of Melilot taint in wheat, the work from the Brandon Experimental Farm was laid down in two divisions: (A) Threshing wheat sheaves that contained

varying quantities of Sweet Clover. This was under the direction of Mr. A. J. Strachan and conducted at the Dominion Reclamation Station, Melita; and (B) The making up of synthetic mixtures of wheat and clover. This was under the direction of Mr. W. H. Johnston and conducted at the Brandon Experimental Farm.

(A) The separation of the sheaves from clover infested fields into the various classifications was done at the time of cutting the crop. The sheaves were left in the stooks from one to two weeks, and threshed August 18 and 19, with an old Moody plot thresher. Some sheaves were threshed dry; others were dampened previous to threshing. Heads of wheat from clover infested sheaves were threshed without threshing any of the clover. Both White and Yellow Blossom clovers were used. The threshed grain was put into sealed containers and forwarded to the Dominion Grain Research Laboratory, Winnipeg. Each container was given a number. The outline of the experiment with identification numbers was not sent to the Research Laboratory, but to Professor Harrison of the Board of Grain Commissioners.

Certain observations will be of interest:

There did not appear to be any difference between Yellow Blossom and White Blossom sweet clovers in their effect on tainting wheat.

In general, it may be stated that wheat threshed from sheaves containing a heavy infestation of clover carried a much stronger odor than where the infestation was light.

Wheat threshed from the heads of sheaves without threshing the clover reduced the odor to a very slight amount.

Wheat from clover-free wheat sheaves stooked on sweet clover stubble did not have any odor.

Heavy growth of seedling sweet clover plants bound in with the sheaves resulted in rejected wheat.

(B) In the synthetic mixtures dry clover seed mixed with wheat to equal 1.5% of the volume, resulted in a very slight taint, and in rejected wheat when the seed was dampened before mixing.

One and one-half cups of chopped sweet clover straw mixed in a gallon wheat, resulted in the wheat grading rejected, whether the clover stems were dry or dampened.

It should be pointed out that 1½% of clover seed and one and one-half cups of chopped sweet clover straw in a gallon of wheat are in excess of the quantities found in commercial grain.

General Recommendations:

1. Sow very shallow only properly scarified seed early in the spring, and into a firm seed bed.
2. Summerfallow after a crop of sweet clover seed, and induce fall and spring germination of the shattered seed by shallow tillage.
3. Cut sweet clover for hay in the early bloom stage; thoroughly summerfallowing the land for the remainder of the season. Do not permit a second growth of clover, thus running the risk of seed maturing on the branches left by the mower or binder.

4. Where there are seedling sweet clover plants in stubble in fields intended for grain the next year, plough or one-way disc immediately behind the binder. Late fall and early spring treatments only transplant the roots. Early fall treatments destroy the seedling plants.
5. Destroy sweet clover plants on all waste land adjoining the farm. Sweet clover seeds drift on the snow crust.
6. Where sweet clover is present in a grain field, thresh only when dry.
7. Have the grain cleaned at threshing time or immediately after, removing seeds, clover leaves and broken stems.
8. Do not mix wheat having a sweet clover taint with wheat from clean fields.
9. Do not use wheat as a nurse crop in seeding down sweet clover.

The Handling of Commercial Corn
By W. S. Frazer

The handling of Manitoba's new grain crop - CORN - has presented many problems not met with in the handling of other cereals and this paper will endeavour to show what these problems are and to explain the various steps in the marketing of corn.

Farmers in the municipalities of Stanley and Rhineland turned to corn in 1933 from desire to secure fodder for their livestock during years of drouth and grasshoppers, with no thought of considering it as a cash crop. However, within a short time the growers commenced saving their own seed, started feeding the grain to their livestock and by 1936 produced a surplus for sale. Production increased to a point when in the fall of 1939 there were in the two municipalities a total of some 100,000 bushels in the hands of Elevator Companies and private buyers, with perhaps another 50,000 in farmers' hands over and above the amount saved for seed and for local feeding.

The credit for pioneering the handling of commercial corn should go to the McCabe Bros. Grain Co., who purchased the first carload of feed corn to be assembled in western Canada. The Federal Grain Company is now purchasing feed corn, in addition to three local firms dealing in corn. The feed merchants in Winnipeg have been ready purchasersof corn by the truckload.

With this as a background, let us consider the actual problems encountered:

1. Varieties Best Suited to the Production of Commercial Corn

The first requirement of a feed corn is that it must be yellow in color. There is a prejudice against red corn, (which, by the way, is unfounded) thus eliminating Northwestern Dent, and leaving Falconer and Minnesota No. 13, the only other varieties which will mature satisfactorily. Falconer, matures earlier and has consistently given the highest yield of shelled corn. At least 95% of all feed corn marketed is of this variety.

2. Purchasing Corn, Shelled or on the Cob.

Doubtless the Grain Trade would prefer to purchase only dry, shelled corn, but as corn comes from the field carrying excess moisture, it must be dried before shelling. Few farmers have drying facilities and as they are anxious to sell their corn as

soon as possible, the Trade has co-operated by purchasing corn on the cob and drying it at the assembling point.

3. Number of Pounds Allowed per Bushel for Ear Corn

The writer is indebted to Mr. W. E. Krocker, Winkler for the following information:

"Good average field-run Falconer will require at least 72 pounds of cob corn to shell out one bushel, basis 14% moisture. To get a bushel from 80 pounds of cob corn, the moisture must be below 20%. A convenient table would be to add one pound above this for each % moisture up to about 30%. Above this, somewhat more than a pound should be added, s it seems that the cob holds relatively more moisture than grain at higher moisture levels. In 1939 the moisture content was about 35% on October 16th. After a few days this dropped to 30%, and at the close of the husking season, it was above 25%."

4. Drying and Shelling Ear Corn at the assembling point.

The Grain Trade has adopted a uniform method of storing and drying ear corn. It is being stored in silo type cribs made of snowfencing erected two tiers high on a wooden platform 16 feet in diameter with a ventilator 2½ feet square up the centre. It is essential that the ears are free of all silk or husk before being placed in the crib.

It is interesting to note that corn has not been dried satisfactorily to date by the use of the commercial "Morris" drier, owing to the fact that the kernel is shrivelled and the appearance is spoilt by too rapid drying at high temperatures.

Shelling is done by a power sheller with a capacity of 100 to 150 bushels per hour and the corn is then put through the elevator in the usual way.

5. Corn Grades for Western Canada

Following the Agronomists' Convention 1938, a committee met to consider this question and it was decided that corn marketing had reached the point where the Canada Grain Act should contain a set of corn grades suitable to Manitoba conditions. Following consultation with the producers and the grain trade, a set of grades was recommended and later incorporated in the Canada Grain Act.

A copy of these grades is attached hereto, the essential features of which may be briefly summarized as follows:

1. The grades shall be known as:
   Nos. 1,2,3,4,5. Canada Western Yellow-color yellow, dent or semi-dent equal to Falconer.
   Nos. 1,2,3,4,5. Canada Western White.
   Nos. 1,2,3,4,5. Canada Western Mixed - mixed as to colors.
   Sample Canada Western-any corn that does not meet the other requirements.
2. The weights in each case shall be as follows:
   No. 1, 56 lbs. No. 2, 54 lbs. No. 3, 52 lbs. No. 4, 50 lbs. No. 5, 47 lbs.
3. The Moisture Content:
   15.5% moisture - straight grade.
   15.5% to 17% - shall be graded tough. } In the grade to which
   Over 17% - shall be graded damp. } it would otherwise fall

4. Other Factors taken into consideration are:
   (a) Variation in type
   (b) Degree of soundness
   (c) Percentage of damaged corn

5. A No. 12 metal sieve, perforated with round holes, 12/64" in diameter shall be used to determine the percentage of cracked kernels and foreign material.

From the foregoing it will be seen that the marketing of feed corn is now fairly well organized but the question of moisture content is still a problem which concerns both purchasers and sellers of corn and something more definite will have to be worked out governing the purchase of ear corn at different moisture levels.

SEED GRADING COMMITTEE

Production of Forage Crops for Registration

By W.T. Wiener and read by F.L.Dickinson

The object of the present forage crop policy of registration is to make each improved variety or strain mean something to agriculture - in other words, to carry to the user of seed as great a measure of its good qualities as is possible. The only way to do this is to provide the means whereby seed can be produced without loss to the variety or strain through adulteration of all or a part of its good characteristics.

Because most of our forage crop plants are open pollinated, it is more difficult to attain this result than is the case with grain crops. In the case of wheat, oats and barley we maintain the varietal characteristics by repeatedly processing stocks either as elite or as foundation. Further, the stocks are periodically tested to see that they are performing to best advantage. However, with the open pollinated forage crops this is not possible because if some one characteristic is lost or destroyed in the process of multiplication, the whole value of that particular strain may for all practical purposes be lost for a period of twenty years or more. In fact, our plant breeders look upon twenty years in the development of a forage crop strain suitable for foundation or elite stock seed purposes as just a beginning. So, you see, since we cannot readily recover what is lost (by cross fertilization) we must provide against adulteration of base stocks by this means.

It is difficult to over-emphasize the importance of maintaining elite and foundation stocks free from adulteration through cross fertilization. To accomplish this, the Association prescribes very severe conditions for the production of elite stock seed crops.

We require careful separation from other crops that cross with the registered sort, and also specially careful handling of the crop to prevent mechanical mixtures in the elite.

Because many of our forage crop plants are open pollinated, and therefore subject to two forms of mixing, namely by cross

pollination and mechanical mixing, the methods used for the production of registered stocks of these crops are very different from those used for the production of seed stocks of the close pollinated seed crops.

In the production of cereal crops growers may continue to use registered seed for the establishing of registered seed crops.

In the case of forage crops the grower must use elite stock or stocks approved for the purpose of registration. The object here is to place in the hands of the registered seed grower stocks that are as free from contamination as it is humanly possible to provide. Registered seed, therefore, insofar as the forage crops are concerned, may not be used to establish seed crops for registration.

Grimm alfalfa, because it has been registered for many years and registration commenced on the cereal crop principle, is the only exception to this rule. This variety will shortly be placed on the same basis as other forage crop plants.

In requiring all growers of registered forage crops to use elite or approved seed with which to begin registration, we prevent possible deterioration of the strain before it reaches the hands of the registered seed grower. In the event of the seed stock having been subject to a small amount of cross fertilization, it only requires a few generations of multiplication to materially increase the variability.

The plan followed in using elite as the beginning of registration assures the registered seed grower of a high degree of uniformity in the stocks with which he begins the production of a registered crop.

Another point to be considered is the fact that any deterioration which results in the stock after it reaches the registered seed grower is largely his own reponsibility. The registered seed grower, having started with the best possible seed has no one to blame but himself if the stocks run out. If his stocks are shown to be inferior, he is required to clean up and begin with fresh seed.

One example will suffice to illustrate my point, namely the brome grass strains Parkland and Superior. Parkland has a weakly creeping root system, while Superior is a stronger creeping rooted type. If these two strains are planted side by side they will cross readily, and the strongly creeping types will soon force the other types out of existence. Thus, one multiplication of Parkland brome, under conditions where cross fertilization is possible, may mean a loss of the desirable characteristics of the strain. The practical application of the resulting harm done by cross fertilization is shown if we consider the use of the two strains. The farmer who through experience finds that Parkland is a very desirable strain with him, particularly because of its less vigorous creeping root stocks, might be seriously harmed if he were supplied with seed from a crop which had been subject to cross pollination.

Thus, the object of registration, as stated in my first paragraph and our regulations, merely provides methods of production which make it possible to attain our objective.

In this system of operation careless production of elite and foundation stock is our greatest menace.

The argument that we are preventing the use and distribution of good seed by refusing registration to seed crops produced under doubtful conditions is quite commonly advanced. The Canadian Seed Growers' Association is not preventing the use and distribution of good seed under such circumstances, but is merely preventing the use of doubtful seed for multiplication as registered stocks. Past experience in this connection shows that any weakening on the part of the Association to consider such arguments results in injury to both the pocket-book and the reputation of the grower, and ultimately reflects back upon the producer of elite and foundation stocks.

United States Federal Seed Act 1939

Mr. A. C. Heise outlined the changes that became effective August 9, 1939. Copies of the Act may be secured from the Grain & Seed Division, Agricultural Marketing Service, U. S.D.A. Washington, D.C.

Amendments to Regulations Under the Seeds Act 1939

Mr. J. E. Blakeman outlined the changes in the Act that became effective September 1939 and are published in the latest edition of the Seeds Act and Regulations of same date. Copies of the Act can be had on application.

EXTENSION AND PUBLICITY COMMITTEE

By R.D.Colquette

Last year the following resolution was proposed at the Annual Convention of Manitoba Agronomists:

"In view of the importance attached to timeliness and efficiency of field operations and that almost one-quarter of the arable land in this province is summerfallowed each year, and that the cultural methods used for both summerfallow and second crop fields are not generally well done, your farm management committee recommend that greater publicity as to the value of sound cultural practice be given by way of summerfallow demonstrations throughout the entire season, by the press, the radio and by agricultural extension workers.

"It is recommended that the Manitoba Agronomists set up a tillage publicity committee which would collect the important experimental data on desirable tillage methods already available at different experimental farms, supplement same by local demonstrations and observations and conspicuously compare the good with the undesirable but commonly practiced methods and systematically bring them to the attention of the average farmer.

"It is assumed that such a committee, if appointed, would work in closest harmony with the extension service."

The above resolution was amended to place the work in the hands of the Extension and Publicity Committee.

Your committee met and considered these instructions and would draw your attention to some difficulties with which it was confronted. We assume that the first part of the resolution, namely "that greater publicity as to the value of sound cultural practice be given by way of summerfallow demonstrations throughout the entire season, by the press, the radio and particularly by Agricultural Extension workers," was a statement of general principles.

The second paragraph of the resolution, however, instructed the publicity committee to supplement available data by local demonstrations and observations conspicuously comparing good and undesirable methods. We respectfully call your attention to the fact that it is not the function of a publicity committee to conduct experiments or demonstrations or make observations. Such work would entail, for example, considerable expenditures of money with which your committee was not provided.

It was felt by the committee that its work narrowed down for the present to the recommendation of methods by which greater publicity can be given to the scientific knowledge of farm practices coming within the purview of this conference. Before doing so we would call your attention to the valuable work that is already being done in this field by the agricultural press, by the country weeklies, by agricultural workers through private contact, public meetings and other means and by the special experimental and field work undertaken in the southwestern area under the provisions of the P.F.R.A.

In the field of agronomy in general and more particularly as regards tillage, the problems confronted are largely local. This is <u>the</u> paramount consideration when considering methods of publicity. In other fields general principles may apply over a large area. For example in hog raising a certain piece of advice may be just as applicable in the Red Deer district as in the Swan River Valley. The ranchers of Alberta and of Texas have many problems in common. But it is unnecessary except for purposes of emphasis, to tell this body that approved tillage practices in the Melita district are wholly different from those recommended in the Morden area and both differ widely from those suited to the Portage Plains. What would be commendable or passable tillage practice in the Swan River Valley would be ruinous in most other sections of the province. There are some general principles that apply everywhere but we assume that what you desire is not the reiteration of general principles so much as the dissemination of specific advice.

Your committee submits, therefore, that such further experimental and demonstrational work in cultural practices as may be desirable, does not come within the scope of this committee but must be conducted by governmental, or government assisted agencies. With regard to educational and publicity work we submit the following recommendations:

1. That the province should be zoned for cultural practices, basing the zones on the predominant soil types and climatic conditions. We believe that this body has sufficient knowledge of the soil types and climatic conditions of the different sections of the province to complete such a zoning.

2. For each separate zone a definite set of cultural practices should be drawn up. This could be done by a small central committee but in drafting recommendations for each zone it should call into consultation the men who have the most intimate knowledge of the conditions in that particular zone. It would be well to include among them agricultural representatives and some successful farmers.
3. As to publicity, chief reliance should be on local weekly newspapers. Each would be supplied at intervals throughout the season with timely material applicable in the territory which it serves. This material should be prepared with a view to readability and digestibility and contain references to successful local farmers wherever possible. We understand that some agricultural representatives now have arrangements with local newspapers to supply timely suggestions to local farmers. This is highly commendable and we suggest that the practice be extended wherever possible, but in addition we recommend a regular service by which material would be supplied by the department of agriculture.
4. The material for all the zones should be made available to the farm press. With their widespread circulations they cannot, naturally, devote much space to recommendations for local areas, but from such material they would be able to glean information for the general guidance of their readers.
5. The agricultural representatives and field men of the department would aid in the dissemination of such material in their private contacts and through public meetings.
6. The Brandon and Morden Experimental Farms now supply reliable and well prepared news notes for the use of weekly and other papers. This is good work and we assume that it will be continued.
7. The use of illustrations should be a cardinal feature of publicity work. Of particular value would be sets of good photographs showing the various steps in good cultural practices, and their results in crop stands. The use of photographs showing the contrasts between good and bad practices would have great value. Field workers and others might profitably make use of a camera to record important features of agronomy work in order that more material might be available for the press.
8. Consideration might be given to the idea of supplying free halftone engravings to country weeklies. The engravings would be made mostly from photographs taken in the zone wherein the paper publishing them has its circulation. They should be ready to slip into the forms as the paper is made up. Country editors would no doubt welcome this opportunity to add to the attractiveness of, and interest in their papers.
9. We would recommend that agricultural representatives and department fieldmen be given special instruction in the use of the camera at your annual conferences. A competition might also be arranged and some kind of recognition given, perhaps only verbal, for the best camera work done in the season. The competition would be a feature of your annual meetings.

The services of the Extension and Publicity Committee, or of any of its individual members, are at all times available in working out the details of any of these recommendations. At the

same time we suggest that while a Publicity Committee of this body may be able to find time to offer such suggestions as are herein offered, it can scarcely be expected to function throughout the year in the way of frequently contacting the press. To do this requires the services of someone who has time for such work and the facilities under his own command to carry on the task.

FORAGE CROP COMMITTEE

The Straw Stack Silo
By T.A. Johnson

Corn has become an increasingly important crop in Manitoba during the past few years. It is essential therefore that the best ways and means of making use of it as a feed on the average farm are made available to all concerned. Corn silage has been accepted, without question, as a valuable feed, but the question of the cost of construction and maintainence of a silo have been one of the factors which limits its wider use.

Origin

As far as we know the first straw stack silo in Manitoba was made by Mr. A. McEachern near Carman in 1933. It was just an idea that he wanted to try out and it proved to be a success. Since then many farmers in the district have used the idea and all reports so far indicate complete satisfaction with the results.

Advantages:

1. No cost for material when straw is available.
2. Can be built any size to meet requirements.
3. Can be built in any suitable location.
4. Straw can be used for bedding leaving the site clear in the spring.
5. Quality of silage compares favorably with that stored in any other type of silo.
6. No more difficult to get silage out of than other types.
7. Requires only the usual equipment for filling.
8. Does not require additional fillings to take care of settling.

Disadvantages:

1. Some extra labor required to cover with straw.
2. Some spoilage may result from insufficient packing and improper stacking.

Construction:

First choose a convenient and suitable location. It is not recommended to place ensilage against a building.

A long pole should be set in the ground to support the blower pipe (unless the pipe is strong enough to stand without support).

Plae cutting box, attack length of blower pipe required for a start and tie the pipe to the upright pole. A flexible outlet spout on the blower pipe will facilitate stacking. The blower pipe can be lengthened as required.

The diameter of the stack of ensilage will vary according to the amount of corn available. Usually round stacks are built.

A stack 16 ft. in diameter and 14 ft. high when first built, will contain approximately 100 tons. With three men on the stack the sides can be kept straight (up and down) without using forms or upright supports. Four or five straight poles or 2x4's set in the ground around the circle may be used as guides to aid the stackers. These guides should be removed when the stack is complete.

The same rules apply in building a straw stack silo as in filling any other kind. If the corn is dry, water should be added. This can be done by placing a barrel or tank on supports above the cutting box with a valve to regulate the flow into the blower pipe. Corn going into a silo should carry as much moisture as it will hold. The driest corn should be placed in the bottom of the stack. Ensilage should be well packed. A Horse on the stack will aid in packing. No difficulty has been experienced by those who have used a horse in getting it off a stack up to eight feet in height. Straw should be placed for the horse to slide on to. An additional man may be required on the stack after the horse is removed. This will depend upon the number of teams drawing to the cutting box. Too much stress cannot be placed upon the importance of having the ensilage well packed and carrying sufficient moisture. The ensilage should be kept evenly distributed over the top of the stack and the top kept level at all times. As the stack nears completion the diameter can be decreased. Finish with a well rounded top. The stack should be at least 14 ft. high when finished.

As soon as the stack of ensilage has been completed, it should then be covered with straw. If the work has been properly planned beforehand, stacks of sheaves can be threshed over the ensilage and a proper covering built, but if sheaves for threshing are not then available, straw can be drawn in from the field. There should be from six to eight feet of straw around the outside. This can be built up as high as can be reached from the wagon and from thereon up a circular ramp of straw can be built up around the stack, working the straw up the ramp until the whole has been covered. Straw should be piled to a depth of six or eight feet over the top. The loose straw can be then cleaned up around the stack to improve the appearance and to prevent the collection of snowdrifts.

Feeding of silage can be started at any time by opening the stack in the most convenient place and the straw can be used as needed. Stout upright posts can be placed under any overhanging straw for protection if needed. Some farmers take all straw away from a side as soon as it is no longer required.

Occasionally there is some spoiled silage where it comes in contact with the straw, but livestock will eat this with apparently no harmful results if fed in limited quantities.

Silage stored as outlined above has been used until late in the spring or until grass comes. As far as is known no effort has been made to keep a straw stack silo over for the following season, but it would appear, however, that this method of storing would be as satisfactory for that purpose as for any other type of silo, providing the stack has not been opened.

Corn for Pasture

By T.A. Johnson.

The term "Hogging Off" is one commonly used in the corn belt in the United States when referring to the practice of allowing hogs or other livestock to feed in fields of growing corn. This practice has been followed there quite extensively for over thirty years.

The same method of feeding was started at least as early as 1922 in Manitoba. In that year W. L. McDonald, Deloraine, turned a carload of steers into a corn field when the corn was just past the roasting ear stage, and left them there until late in the fall. Sweet clover pasture and water and salt were also provided. Mr. McDonald stated that he did not think the steers could have made as quick or as economical gains under any other conditions. Since then many farmers in Manitoba have followed this practice and all reports indicate that this method of feeding should be given more publicity and encouragement.

There is usually a period around threshing time when pastures are short and there is trouble in keeping cattle within the fences. A few acres of corn at this time, even though it were not mature, would save the farmer considerable trouble in a busy season. It would also prevent loss of weight in his beef cattle and loss of milk in his dairy herd. If there is enough corn the cattle can be left in the field until bad weather comes when they should be in good condition to start the winter. This will mean a big saving in feed during cold weather.

Earlier maturing varieties of corn such as Jehu will provide earlier feed, but any of the common varieties of corn can be used as pasture. It is difficult to estimate the number of head that an acre of corn will carry as there is so much variation in yields due to different conditions. Probably about one are for every two head would be reasonable to suggest to the man who plans to try this method of feeding. In 1939 which was probably one of our poorest corn years, Mr. J. F. Loree of Carman pastured 75 head of steers on 45 acres for seven weeks. He usually fences off about one acre for each ten head and turns them in around the 20th of August. As more feed is required he moves the fence to take in more corn. This prevents waste. He usually has his cattle in the corn field from eight to ten weeks. When fattening cattle are removed from the corn field there should be no reduction in grain if some harvested corn is fed for awhile, along with a full feed of other grains.

For the crop following corn, Mr. Loree recommends, after trying different methods of preparation, that the stalks be mowed, raked and burned after the snow is off and before the frost is out of the ground in the spring if possible. He then sows crosswise of the cultivator furrows, without any other preparation if he can get the drill in deep enough to cover the seed. The crops following corn have been equal to those on summerfallow.

Some trouble may be experienced if cattle are moved from short pasture to a cornfield and permitted to gorge themselves. This trouble can be avoided by allowing the cattle in the field from short to lengthening periods each day until they become accustomed to having all they want.

Hybrid Corn

By A. C. Ferguson

Realizing that corn can be grown readily in Manitoba, and that seed produced here has demanded a premium in other markets, farmers are planting more and more acres to corn. As the farmer is interested in obtaining the highest possible yields with any crop he grows, he has started to cast about for a superior yielding corn. While standard varieties have proven their worth in the past, they are being replaced in the corn area of the United States by superior F1 hybrids. In 1939, 65% of the corn planted in the United States was hybrid seed. It seems reasonable to suppose, therefore, that when adapted hybrids are produced they will replace standard varieties in Manitoba also.

Hybrid corn is a comparatively recent development. Present day methods in corn breeding were initiated by East at Connecticut in 1905, but it was not until 1920 that extensive programs for the development of corn hybrids were started.

The Meaning of the term "Hybrid Corn"

Strictly speaking, a cross between two different lines of corn is a hybrid. The term "hybrid corn", however, as now employed, designates the first generation of a cross involving inbred lines and is associated with superior qualities that cannot be obtained by crossing ordinary lines. This superiority may be due to higher yields, greater uniformity, greater disease resistance, or some other desirable feature. It must be emphasized that hybrid vigor is not lasting. Segregation occurs in the second generation resulting in great variability between plants with a reduction in yield of approximately 20%. It is necessary, therefore, to procure new hybrid seed each year.

Producing the Inbred.

The first requisite of a hybrid corn program is the production of inbred lines. This involves the selection of foundation stock from some commercial variety and selfing through several generations. The usual minimum limit of selfing is five generations. Inbreeding results in a marked loss of general plant vigor, but this is restored with dividends in the first generation of a cross between inbred lines.

Reasons for Inbreeding.

Corn is naturally cross pollinated and thus ordinary lines are not pure as to inheritance. They are composites of late, early, tall, short, low and high yielding corns. The chief reason for inbreeding is to obtain true breeding lines so that selection of the best hereditary material is possible. Selfing brings to light deleterious recessive characters ordinarily masked, and permits their elimination. Plants of inbred strains become uniform as to growth habit and transmit this uniformity to the F1 of a cross between inbreds. Throughout the selfing period selection is carried out with a result that only lines possessing the desirable characters are retained. The isolation of good inbred strains requires that many lines be tested. It is estimated that ten to twenty thousand pollinations are made at Ames, Iowa, each year.

Producing the Hybrid.

Several kinds of hybrids are possible -

1. Single Cross-crossing two inbred lines.
2. Double Cross-crossing two single crosses.
3. Three Way Cross-crossing one inbred with a single cross.
4. Multiple Cross-crossing double crosses.
5. Top Cross-crossing inbred with an open pollinated line.
6. Synthetic Variety-allowing many inbreds to cross.

Each type of cross has its use. The single and double cross will be discussed here as they are used most commonly.

Single crosses posses greater uniformity than double crosses and often yield higher, but it is the double cross that is grown most extensively. This arises from the fact that production of double cross seed in large quantities is a much less costly and less risky process. This follows when considering that single cross seed is produced on the small ear of the inbred, while double cross seed is produced on the larger ears of the single cross. Also, single crosses withstand adverse weather conditions better than the inbreds, thus reducing the possibility of crop failures.

Not all hybrids are superior to the commercial variety from which the inbred lines have been isolated. This necessitates the production and testing of numerous crosses. Thus far the procedure is carried out by bagging and hand pollination. When a superior hybrid has been developed, production of seed is carried out on a larger scale. To accomplish this, isolated crossing blocks are planted. In these blocks the line acting as the male parent and the line serving as the female are planted side by side in rows. In the single crossing block, one male row supplies pollen for two female rows, while in the double cross the ratio is as 1:3. Tassels are removed from plants in the female rows after they emerge from the "boot" and before dehiscing. Hybrid seed is produced on the detasselled plants. In the case of the single cross, inbred seed is produced on plants of the pollen parent.

Performance of Hybrids.

In varietal yield trials for corn at institutions in the United States, hybrids have proven their superiority over open pollinated varieties. Results 1936, to 1938, at the Michigan State College, show that an adapted hybrid yielded 26.3% more shelled corn than a widely grown open pollinated variety. Similar results could be cited for Iowa, Illinois or Minnesota.

In the 1938 report of hybrid corn trials in North Dakota, this significant statement was made - "In general, the field appearance of hybrids was superior to the best open pollinated varieties. Hybrids showed more uniformity in maturity, plant type, and height, and were more resistant to lodging, making it possible to harvest them with less waste and inconvenience than the easily lodging open pollinated varieties."

During the past two years six Minnesota #13 hybrids, obtained from Northrup King Company, have been tested at the Dominion Experimental Station, Morden. Two of these required 3 to 6 days longer than Minn. # 13 to mature seed and are, therefore, considered on the border line of adapted sorts. The other four failed to mature seed. It is noteworthy that the two maturing seed, out-yielded Minn.#13 in shelled corn by

by 30-35%. In dry matter tonnage five of the six hybrids out-yielded the check by 30-90%.

In 1939 six double crosses, supplied by Dr. Olson of the University of Manitoba, were grown in test at Morden with Minn. # 13.

Results show -

1. Hybrids matured 1 - 4 days earlier than the check.
2. Yield of hybrids 14.8 - 25.7 bus/acre of shelled corn. Yield of check 6.7 bus/acre of shelled corn.
3. The uniformity exhibited by the hybrids in height, maturity and general growth habit was a marked contrast to the variability shown by the standard variety.

Data supplied by the University of Manitoba substantiate results at Morden. In 1938, North Dakota hybrids, including 14 single crosses and 5 double crosses, were tested at Fort Garry against 8 lines of the parent variety Minnesota # 13. In yield of shelled corn -

Single crosses averaged 35.34 bus/acre
Double crosses averaged 28.40 bus/acre
Minn. # 13 averaged 25.70 bus/acre

In comparing maturity, quality and uniformity of ears, it was noted that single crosses rated 90% good to excellent; double crosses 65% fair to good, none rating excellent, and the check rating 70% poor to very poor.

Unfortunately 1939 results were not available at the time this paper was prepared.

It is admitted that hybrid testing in Manitoba has not been extensive and results obtained cannot be regarded as conclusive. However, the fact that hybrids have proven superior beyond doubt in the United States, and for the past two years have been superior where tested in Manitoba, indicates that definite possibilities are to be realized in the development and growing of first generation hybrid corn in the Manitoba area.

At present two institutions in Manitoba are engaged in extensive corn breeding programs. The Plant Science department of the University of Manitoba has, under the supervision of Dr. P.J. Olson, placed a great deal of emphasis on hybrid corn. At the Dominion Experimental Station, Morden, a new corn improvement program was initiated in the spring of 1939. In former years some work in corn breeding has been done at the Brandon Farm. This has been discontinued for the most part, and results of that institution's work transferred to Morden. What has been accomplished at Fort Garry and Morden will be outlined in the progress reports for those institutions.

Considering that plant breeders and farmers alike are becoming increasingly corn conscious each year, it is to be expected that within a few years, hybrid corn growing in Manitoba will be a well established industry.

SEED SETTING IN ALFALFA

A Progress Report of Investigations conducted in the Division of Plant Science, University of Manitoba, during the year 1939

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A. J. Lejeune and P.J.Olson

This investigation was initiated in response to a request by the Manitoba Seed Growers' Association and was supported by an appropriation of $1000.00 made available by the Manitoba Department of Agriculture.

The investigation included experiments under the following heads.

1. Effect of artificial tripping on seed setting.
2. Effect of clipping at various dates upon seed yield.
3. The effect of soil treatment, with lime and phosphorus upon seed setting and seed yield.
4. The relation of insects to tripping of alfalfa flowers.

The Effect of Artificial Tripping of Individual Flowers.

The following treatments were applied to a number of alfalfa plants, three plants being used for each treatment.

1. Plants caged, not tripped.
2. Plants caged, tripped by hand.
3. Plants not caged, not tripped.
4. Plants not caged, tripped by hand.

All the racemes worked with were tagged, and the number of flowers on each raceme counted. When the seed was mature, these racemes were harvested, the number of pods per raceme and the number of seeds per pod were recorded.

The following table presents the data obtained.

Treatment	No. of Flowers	No. of Pods Formed	No. of Seeds Formed	% Flowers forming Pods	% Pods forming Seed	% Flowers Forming Seed	No. of Seed per Pod
Caged untripped	2008	67	52	3.3	59.7	2.6	0.77
Caged tripped	3193	894	1523	28.0	85.2	47.7	1.80
Uncaged untripped	2200	162	333	7.4	87.6	15.1	2.00
Uncaged tripped	2430	794	1214	32.7	83.3	50.0	1.50

The total number of flowers handled is 9831.

It is evident from the above that hand tripping brought about a very marked increase in the amount of seed set. In caged plants tripping increased the amount of seed more than twenty-fold (47.7 as against 2.6 per cent.). In uncaged plants the increase was more than three-fold (50 as against 15.1 per cent.).

The per cent of flowers forming pods and the per cent of pods forming seed must also be taken into account, because there may be more than one seed per pod and some pods do not produce seed.

In caged plants tripping increased pod formation more than eight-fold (28.0 as against 3.3 per cent.).

In uncaged plants the increase was more than four-fold (32.7 as against 7.4 per cent.).

The per cent. of pods forming seed was practically the same for the uncaged plants and the caged tripped plants, but on the caged untripped plants the per cent. of pods forming seed was 59.7 as against 85.2, 87.6, and 83.3 for the caged tripped, uncaged untripped, and uncaged tripped plants respectively.

Results from the use of Various Mechanical Devices in an Effort to trip Flowers on a Large Scale.

This experiment was conducted in a field in which Macsel alfalfa was planted in rows. The field is about 5 years old. The various devices, each of which is described in the accompanying table, were dragged lengthwise of the rows. A special device was constructed consisting of a cylinder ten inches in diameter into which in one case, finishing nails were driven so as to protrude about an inch and spaced one inch in horizontal rows, and the rows four inches apart. In another case scrubbing brushes with fibre bristles were placed between the rows of nails. This device was mounted on a frame, and was drawn lengthwise of the rows in such a way that the fram straddled the row. The cylinder was rotated with a crank in such a way that many of the pegs or brush bristles came into contact with a considerable number of the flowers in the row. The other devices are described in sufficient detail in the body of the accompanying table.

The flowers in the rows treated were examined before and after treatment to determine whether or not tripping was actually accomplished. The approximate proportion of flowers tripped as well as subsequent yields are shown in the accompanying table.

Treatment	% of Flowers Tripped	Yield in Grams
Check	26:62	245.66
Float dragged without weight	59:09	178:66
Float dragged with 175 lb. weight	50:94	102:00
Pole, dragged	35:70	154:66
Wire dragged	21:17	192:66
Harrow dragged upside down	34:07	107:66
Rotary cylinder with pegs	25:20	155:00
Rotary cylinder with brushes	39.46	215.50

It is evident that in no case did the rows tripped yield as much seed as the check or untreated rows. Evidently damage was done to the plants that more than offset the tripping. In some cases the damage was quite apparent. This was especially true of those rows that were dragged with a float or drag harrow. Here the plants were flattened against the ground and never recovered their erect attitude. Moreover there was severe damage to foliage in these rows. The float was more effective than any of the other devices in accomplishing tripping. This is apparently due to the fact that more flowers contacted the greater the pressure applied. It is in line also with the established fact that if a raceme or larger cluster of flowers is rolled between the palms of the hand or drawn between the fingers practically complete tripping is accomplished.

The problem of mechanical tripping is evidently not a simple one. If and when it becomes definitely established that tripping markedly increases seed setting the next problem is to perfect a device that will accomplish tripping without more or less severe damage to plants. It appears that this may call for considerable ingenuity in the first place, and a good deal of experimentation in the second place. Professor Shanks of the University, Faculty of Agriculture, has a plan in his hands now, worked out jointly by himself and us, to be used in row plantings. If the project is continued this will be constructed in time to be ready for use on next year's crop.

The Effect of Seed Setting of Clipping Back Alfalfa at Different Dates.

Plots 1/100 acre in size were laid out and clipped on the respective dates: June 5, June 15, July 1, and July 15. One set of plots was left without clipping as a check against the clipping treatments. The crop was harvested as soon as the seed crop was matured. Each treatment was represented by three plots. The data are presented in the accompanying table, the figures being averaged for the three plots in each case.

Clipping Back at Different Dates as Affecting Seed Setting.

Treatment	Average yield in grams.	Yield per acre in pounds.
June 5	228.33	50
June 15	293.33	65
July 1	361.33	78
July 15	too late to produce seed	
Check (not clipped)	93.00	20

Evidently clipping increased seed production under the conditions prevailing in this field in 1939. Moreover there was a progressive increase with delayed clipping up to and including July 1. Clipping July 15 held the plants back enough so that they did not reach maturity before growth was checked by fall frosts.

Insects in Relation to Tripping.

Under this head careful observations were made of honey bees and wild bees that visited flowers in the alfalfa plots on the University grounds. These bees were followed as they visited the fields and observations made as to (1) the number of the visited flowers that were tripped and (2) the manner in which they approached or manipulated the flowers in extracting nectar from them.

The results as to amount of tripping accomplished are as shown in the accompanying table. This is a summary table. Many bees were observed on several days and at several different periods during the day. In the table the total number of flowers visited by each type of bee and the number of flowers tripped is shown by days. In other words the periods of the day are not shown, and the work of each individual bee is not shown.

A Comparison of the Effectiveness of Honey Bees and Bumble Bees in Tripping Alfalfa Flowers.

	June 20				June 22.				June 23.			
	No. of Bees	Flowers Visited	Flowers Tripped	% tripped	No. of Bees	Flow. vis.	Flow. Trip.	% trip:	# of B.	Fl. V.	Fl. R.	% T.
Honey Bees	12	114	32	28	17	105	19	0.1	16	158	0	0
Bumble Bees	5	40	39	98	6	49	44	90.0	--	---	-	-

The most eloquent data are found in the fourth column under each date. This column shows the per cent. of the flowers visited that were tripped by the honey bees and bumble bees respectively. It is obvious that honey bees were relatively ineffective in tripping flowers while bumble bees were close to 100 per cent. effective. On June 23 no bumble bees were observed, but on this date the honey bees visiting a total of 158 flowers did not trip a single one. Although only superficial observations were made after this date until the end of the flowering period, no honey bee was ever again found to trip a flower.

The method of approach of the bees to the flower although of little practical interest is of considerable academic interest. The bumble bee practically without exception inserted the mouth parts in front of the keel, between it and the standard. This method of approach would be expected to be most effective in

accomplishing tripping. The honey bees in a great many cases approached the side of the flower and inserted the mouth parts between the wing and standard, and thus failed to touch the keel at all.

A number of bumble bees were imprisioned with plants in wire cages. These did not seem to thrive under confinement. They seemed to spend most of their time in an effort to get out of the cages.

A Study of the Effect of a High Lime Content in the Soil, and of Certain Fertilizer Treatments upon Seed Setting.

The most significant experiment under this heas to date is one in which some synthetic plots have been established. In cooperation with Professor Ellis, a site was located on the University grounds at which the subsoil at an average depth of two feet was a yellowish gray marl. An area about 2 rods square was therefore excavated to a depth of about $2\frac{1}{2}$ feet. Half of the area was further excavated to an additional $2\frac{1}{2}$ to 3 feet depth. The marl extending down to that depth was transferred to the other half of the area, with the result that the first five feet of that plot was continuous marl (no black surface soil). The plot excavated to a depth of 5 to $5\frac{1}{2}$ feet was in turn filled with black surface soil to the entire depth. Part of the continuous marl plot was treated with a phosphate fertilizer and the rest left with no treatment. Part of the continuous black soil plot was given a dressing of lime, and the rest left untreated. Alfalfa was sown immediately on both plots. This was done during the middle of July.

Of course no results will be obtained from these plots until next year since no seed could be produced during the present year. It should give information as to the relation of lime and phosphorus to seed setting after having been continued for a period of years. The fact that much of the successful alfalfa seed production in Manitoba is localized in the inter-lake region where one of the outstanding characteristics is a very high lime content in the soil suggested this experiment.

A Report on the Status of Parkland Brome
By J.E. Blakeman

This was a detailed paper which brought out the following points:

Parkland Brome produced by Dr. L. E. Kirk while he was Dominion Agrostologist and licensed for sale April 1936.

Selected from common brome, followed by inbreeding and testing over 12 years.

Differs from common in that plants lack the strong spreading underground stems; plants more dense and leafy.

In 1939 Registration applied for 50 acres with estimated yield of 12,200 lbs.

Preliminary tests would indicate Parkland has a higher degree of drought resistance but is a lower seed yielder than common brome.

FARM MANAGEMENT COMMITTEE

Farm Practices Used in Controlling Soil Drifting
By A. J. Strachan.

The statements made in this summary are based on Experimental Work in Soil Drifting Control conducted on the Dominion Reclamation Station, Melita, and the District Experiment Substations at Lyleton and Goodlands. The soil on the first two stations is quite light in texture and drifts readily, while that on the Goodlands station is a medium clay loam and not as subject to soil drifting. These experiments have been conducted with the object of finding methods that can be used in summer-fallowing that will decrease or eliminate this danger.

The following summary contains the important factors determined in these experiments.

SUMMARY

1. A trash cover is the most important single factor in controlling soil drifting.
2. The amount of trash can be increased by the use of crop rotations where the stubble of two or more crops accumulates before the summer-fallow year.
3. The cost of preparing a surface worked fallow is lower than for a ploughed fallow.
4. The duck-foot cultivator where it can be successfully operated, is the best machine with which to work ploughless fallows. It leaves more trash on the surface.
5. Wheat yields as high on ploughless fallow as on ploughed summer-fallows.
6. Two years out of three surface worked fallows have shown considerably more moisture than ploughed fallows.
7. A straw mulch applied in the autumn prevents winter drifting. It sometimes keeps the soil wet in the spring and delays seeding.
8. Corn in wide rows is useful as a protective crop on summer-fallows.
9. Strip farming aids in limiting soil drifting by decreasing the area over which drifting can spread.

10. Cover crops have not been successful due to the ravage of grasshoppers.
11. In the past two seasons basin listing has not increased moisture reserves.
12. Couch grass can be eradicated on light land without creating a drifting condition by use of the duck-foot cultivator equipped with 2½ inch points.

Fundamental Concepts in Agriculture
By K. D. McLean

This paper was of a general nature. Some of the points brought out were:

Success in farming should include "Profits" and "Pleasure"
Capacity of a farm to produce depends upon: the ability of the farmer, a proper balance between field crops and live stock, and efficient handling of these.
To attain operating efficiency the farmer should have an objective, ascertain where his enterprises fall short of this, then formulate a plan that will be followed over a period of years.
Efforts should be made to place in the hands of farmers recent, useful information.

WEEDS COMMITTEE

Leafy Spurge Eradication - Summary Report
Experimental Farm, Brandon,
By D. A. Brown.

The Prairie Farm Rehabilitation Act provided funds in the spring of 1937 to conduct this project. Work took place on cultivated land three miles north of the Experimental Farm. There was a uniformly heavy infestation of Leafy Spurge on this land.

The following is a Summary of results attained:

Conclusions on Cultural Experiments.

1. Two full seasons of thorough summer-fallowing are required to destroy leafy spurge.
2. Ploughing three inches deep was more effective than depths of 5 and 7 inches.
3. The plough and the one-way disc did better work for the first operation than the cultivator with narrow teeth.
4. The number of cultivations required the first season were reduced by starting operations late, but the plan did not give satisfactory results.
5. The most complete kill was obtained on treatments 9,10, and 11 where the one-way disc was used for all operations subsequent to the first breaking.

Conclusions on Chemical Treatments.

1. Results indicate the importance of September treatments and the necessity for follow-up treatments the next summer to destroy seedlings and surviving roots. It will be observed in Block B that complete kills were obtained from August and September treatments, when these were augmented by a third treatment the following June. The three applications totalled three pounds of Atlacide

for every 100 sq. ft. On plots 6 and 20 Block C one and one-half pounds applied in September followed by an equal application the next June resulted in 100% kill.
2. The number of applications is of less importance than the strength of the chemical used, and, the time of year it is applied.
3. The rates of application have a direct influence on cost. Results lead to the inference that when the amount is limited to one lb. per hundred sq. ft. the applications necessary to obtain a complete kill have to be increased. This would increase the cost of labour required.
4. No difference in effectiveness between dusting and spraying was observed. The availability of suitable dusting apparatus on Manitoba farms would, however, limit this method of treatment. There may be less fire hazard when spraying is employed.
5. Applications to the soil after mowing and removing foliage were distinctly more effective than when the chemical was applied to the foliage. This fact differs from the general belief that spraying or dusting the foliage is the best mode of application.

What Can Agronomists do About Weeds?
By C. S. Prodan

This paper was of a general nature, suggesting the following points:

Legislation - To discourage the offering of "surprise flower seed packages"

Education - The most effective approach. Farmers should become acquainted with the more dangerous "new weeds" and isolate and eradicate them before they spread.

Organization - Advisable for districts, municipalities, or larger units to organize to combat some common menace as "leafy spurge".

The Eradication of Dandelions with Mercurated Ethyl Stearate in Kerosene

W. H. Silversides and P. J. Olson

A few investigators, notably Ralston, Christenson and Josh, and Hanley and Weinard have reported signal success in the use of this mixture for the purpose of eradicating dandelions in lawns. An experiment was laid out on the campus of the University of Manitoba during the summer to check the results of these investigations as applied to conditions prevailing here. The work was done as an incidental experiment under a grant for research in Dandelion Eradication furnished by the National Research Council, Ottawa.

Experimental Procedure

The mixture used was a commercial preparation prepared and distributed by Armour and Co. Chemical Division, Chicago. The brand name is MEO - 181. It is primarily a solution of mercurated ethyl stearate in kerosene, and is the outcome of the work of Hanley and Weinard. It was applied at the rate of 1 gallon per 250 square feet on three dates, namely June 20, July 7 and August 21. Each series of plots received only one treatment, namely at only one of the dates, so that the results permitted a comparison of the effectiveness at each date.

Counts were made of the dandelions present before and after spraying in 2 square yard areas within each plot. Moreover the dandelions were located on a chart for each square yard area, so that the amount of reinfestation after spraying could be determined. The plots were 10 x 25 feet in size and there were 3 plots for each treatment. Each treatment was therefore represented by 6 square yard areas.

Results

Summarized results for each treatment are presented in Tables 1. The number of plants that survived the treatment is shown in column 3. In column 5 those plants that made their appearance after the spray was applied are added to the total survivors. The difference between these two columns, therefore, represents the amount of reinfestation.

It is apparent that there was a very high percentage of kill at each of the spraying dates, such percentage ranging from 93.6 to 97.9. There was no significant difference as between dates. However column 5 indicates that the later dates were more

effective in that they permitted less reinfestation. The net reduction of stand following the latest spray was 83.6 as against 39.8 for the first, and 61.2 for the intermediate date.

It was found that the spray killed not only the leaves but the root as well. Plants could be lifted out easily leaving a conspicuous hole.

Table 1

Effect of MEO - 181 applied at the rate of 1 gal. per 250 sq. ft. in reducing dandelions in a lawn.

Date	No of plants before treatment.	No. of treated plants surviving	Reduction in treated plants per cent.	Total No. of plants after treatment(1)	Net Reduction in stand per cent.
June 20	143	3	97.9	86	39.8
July 7	250	16	93.6	97	61.2
Aug. 21	245	13	95.1	40	83.6
Total all treatments	638	32	94.8	223	65.0

(1) includes reinfestation after treatment.

Damage to Grass

The grass was severely though not permanently damaged in all cases. It began to recover in from 4 to 5 weeks after the treatment. In the meantime the stand had been thinned considerably. No effort was made to speed up recovery by copious watering or application of fertilizer.

Some of the plots contained a considerable number of plants of Canada Thistle. These were apparently not affected at all by the spray treatments.

Summary and Conclusions.

The following conclusions appear to be justified:

1. MEO - 181 was highly effective in destroying dandelions, the percentage of kill being about 95.

2. Damage to the lawn grass was severe but not permanent. In view of this damage it appears advisable to retouch the individual plants that appear after the initial spray rather than to apply as heavy an initial dosage.

3. Reinfestation may be partially prevented by a late application of the spray.

THE 1939 EXPERIMENT IN THE NORTHERN JUDICIAL DISTRICT

T. L. Townsend, Farm Manager, Colonization
Finance Corporation, Birtle.

In our project for the eradication of Leafy Spurge and Field Bindweed in the Northern Judicial District consisting of 17 Municipalities south of the Riding Mountains in Manitoba, we were immediately confronted with the problem of the best methods of treatment and control. We did not wish to experiment any more than was necessary. Fortunately for us, the Brandon Experimental Farm had started an experiment in 1937 in the Control of Leafy Spurge on a property about three miles north of the Experimental Farm. This farm is under the supervision of Mr. H. J. Siemens of the Colonization Finance Corporation and it was through their joint efforts that the experiment was undertaken. Members of our Committee made a trip to Brandon and inspected these plots in June before any work was undertaken. Mr. Tinline, Superintendent of the Experimental Farm, was present at our first meeting in Birtle and outlined to us some of their conclusions with respect to their experiments and as a result of our joint deliberations, we came to the conclusion that for our project the treatment that had shown the best results with the least chemical was the treatment of spraying in June with a solution of Atlacide mixed at the rate of one pound of Atlacide to one gallon of water, known as a 10% solution. This was applied at the rate of one gallon of solution to each 100 square feet of area to be treated, one application of this strength to be made in June, followed by another in September of the same year and another application made in June of the following year at the rate of one gallon of a 10% solution to 200 square feet. This is referred to as half an application.

In our work we were unable to get started until the latter part of June and did not complete the first application until near the middle of July. On the whole we were well satisfied with the results of the first application of chemical. In the start of our work we measured off 500 square feet and put five gallons of solution on it. This gave us a fairly good idea of the amount of saturation that one gallon to 100 square feet gave us and thereafter the operators merely made it a point to saturate the foliage and soil within three feet of any plant reasonably well. On checking how much was going on at different times the operators were exceeding the requirements most of the time from 10% to 35% but we believe this was a good policy, otherwise some spots would not receive sufficient as it is impossible to get an exactly even distribution of the solution. We also found that a barrel pump spray where probably 50 lbs. of pressure is developed is much more effective than the small knapsack sprayer as you obtain a much finer spray and much better distribution. The finer the mist the better it clings to the foliage and the better distribution obtained on the soil.

We also found that authorities differed in opinion as to the importance of treating the foliage or the soil. The Chipman Chemical people, who sell Atlacide, emphasize the importance of treating the foliage and state that the plant absorbs the chemical and carries it to the root and in this way kills the plant. In looking over the results of the experiments at Brandon it would appear that in the plots where the foliage was mown and taken off and the soil treated that equally good results were obtained as where the foliage was left on and both soil and foliage treated. We understand that Mr. Pavlychenko of the University of Saskatchewan reports that in his studies it is the toxic effect of the sterile soil at the surface of the ground that kills the young shoots as they try to emerge that is important in the final control of the weed and it requires a higher concentration of chemical to kill the young shoots of Leafy Spurge than of almost any other weedunder his observation.

It would appear from the observation of the Brandon Experimental Farm that no amount of treatment in one year will completely eradicate Leafy Spurge. It must be followed with one or more applications the second year. For example in one of their experiments a 20% solution was applied, that is two lbs. to a gallon to 100 square feet, in each of the months of June, July, August and September, 1937, which amounts to 8 lbs.of chemical to each 100 square feet, and where no follow-up t reatment the next year was undertaken there were quite a number of surviving plants. On the other hand, where the 15% solution was applied on the 20th of September, 1937, and followed with a 15% solution in June, 1938, there was 100% kill apparent in the fall of 1939. We are convinced that the follow-up applications in succeeding years are very important for the completecontrol of Leafy Spurge.

At the time of our second treatment the greatest number of surviving plants were around the edges of the patches. In our second application we made sure that the soil was saturated to at least three feet beyond the last signs of any Leafy Spurge. Apparently the plant sends out shoots beyond the edges of the toxic soil unless the soil is treated well beyond two feet all around. In a large project such as ours, it is quite impossible to not overlook some plants and even patches in the first application. Those that are missed the first time can be given a thorough saturation in the second treatment in the fall and followed with half a treatment the following year which should prove effective in the eradication of the weed. We also believe that in a project like we have undertaken,it is very essential that the follow-up work be carried on for two or three years to make sure that no plants survive or make their appearance at some later date to reinfest the area again. The follow-up work can be done largely with hand sprayers and it is not necessary to have a large outfit travel around to do this type of work.

There is one point on which we cannot obtain much information and that is as to how late in the fall one can effectively treat Leafy Spurge. In our second application we did not get started as soon as anticipated due to sickness on the part of the operator and a snow storm interrupted the work as well as several severe frosts which destroyed most weeds but did not seem to effect the Leafy Spurge a great deal. In some cases the plants turned a reddish color. However, the Committee, after making an inspection of most of the remaining Leafy Spurge patches, decided to continue the second application of chemical on into October. We have yet to determine the wisdom of this plan but are of the opinion that it is quite possible that if the surface soil is in a toxic condition when the young shoots try to emerge in the spring that it may be the most effective part of the treatment with chemical. If it is followed with an application in June it apparently completely exhausts the plant. Our observations from the Brandon experiments and our own seem to point to the fact that the chemical in its action is not unlike cultural methods. It kills the foliage at the time of application and prevents the emergence of young shoots through the toxic surface soil. Those that are successful in coming through are killed in the later application and the toxic condition of the soil immediately around the plant is increased or renewed with the follow-up treatment. We are not sure that this is the right conclusion but our observations would point in that direction.

We can get very little information on definite experimental results for the treating of Field Bindweed. The Chipman Chemical people stated that in Ontario the usual procedure was to treat Field Bindweed in October with a 20% solution, namely, two lbs. of chemical to one gallon of water. We, therefore, treated the patches of Field Bindweed in the Rural Municipality of Miniota in early October with a 20% solution of Atlacide and plan to follow with a 10% solution in June, 1940. The foliage of the Field Bindweed seemed to show the effect of the treatment in a few hours and by the next day was completely burnt down as though a fire had scorched it.

LEAFY SPURGE CONTROL WORK IN NORTHERN JUDICIAL DISTRICT OF MANITOBA.

In 1937 and 1938 we found infestations of Leafy Spurge on three farms under our supervision in the Birtle Zone. An attempt was made to have some action taken by the Municipal Councils in which the farms were situated but in the fall of 1938 we came to the conclusion that our efforts along this line were wasted and that the cost of eradication, excepting where very small patches were found on the farm, was prohibitive to the tenant, almost equally so to the owner, and in some cases completely beyond the capacity of the Municipal Council in question to undertake. Reeve W.C.Wroth of Ellice Municipality and L.C.Carter, Dist.Agriculturist, Russell, were of the same opinion and considered the possibility of spreading the cost of eradicating this weed over a larger group and area so that the cost would not be so great on anyone.

During the winter of 1938 and 1939 we approached officials of interested mortgage companies, Mr. Batho, Weeds Commissioner, Mr. Robt. Whiteman of the Extension Service and Hon. D.L.Campbell, Minister of Agriculture for Manitoba, and discussed this problem with them. As a consequence of these discussions a meeting was called in Birtle on May 18th, 1939, at which some 80 interested people were present, mostly Reeves and Councillors of interested Municipalities, representatives of the Dept. of Agriculture, of mortgage companies and of the Colonization Finance Corporation. At this meeting a Committee consisting of Reeve W.C.Wroth of Ellice as Chairman, Reeves Webb of Birtle, Hyndman of Blanshard, Tragard of Strathclair, L.C.Carter, District Agriculturist, Russell, and T.L.Townsend of the Colonization Finance Corporation of Canada Ltd., Birtle, was instructed to make a survey, locating all the patches of Leafy Spurge in the Northern Judicial District of Manitoba and make a report and recommendation to the Union of Municipalities Northern Judicial Dist.Convention to be held in Newdale on June 14th, 1939. As a result of the Newdale meeting, the Committee was authorized to meet with the Minister of Agriculture and representatives of the Mortgage and Loan Companies to work out a means of financing a campaign with the object of eradicating all of the Leafy Spurge found in the Northern Judicial Dist.

Therefore, on June 23rd and 24th, 1939, the Committee met in Winnipeg with the Minister of Agriculture and other representatives of the Dept. of Agriculture, representatives of several mortgage companies and of the Colonization Finance Corporation. W.H.French, President of the Union of Municipalities and Reeve Beachell of Rosser also contributed to the deliberations. As a result of this conference a campaign was immediately undertaken to treat all of the small patches of Leafy Spurge with chemical and two spraying outfits were immediately put into the field, consisting of a small truck, a steel gasoline drum and a barrel pump sprayer with 25 feet of hose using a fan spray nozzle. Two men accompanied each outfit. Mr. Lorne Carter and T.L.Townsend supervised the actual work in the field.

The chemical was mixed at the rate of one lb. of Atlacide to each gallon of water. The object was to apply one gallon of solution to each 100 square feet in area. After a few trials the operators applied the solution so that the foliage and all surface soil was well saturated. In almost all checks that were subsequently made we found that the operators were applying a little more than one gallon of solution to 100 square feet, which was considered preferable to using less than the desired amount.

The first application was commenced on June 29th and completed on July 15th. Almost 8,000 lbs. of chemical were used in the treatment of patches on 24 farms located in ten Municipalities in the Northern Judicial Dist. of Manitoba. Thus far no Leafy Spurge has been discovered in seven Municipalities of the Northern Judicial Dist. In addition to treating patches with chemical, it was necessary in three cases to undertake

tillage methods of control because of the extent of infestation. In one case - the John Chapman farm in the R.M. of Miniota - about 85 acres of land have been summerfallowed in addition to 1,800 lbs. of chemical used in two treatments on patches in pasture and roadsidesand other fields. This is much the worst infestation in the area. This man has one-way plowed this summerfallow four times, rod weeded it once and cultivated it four times in 1939. It was necessary to make arrangements for this man to get a new tractor and one-way disc and a good cultivator. Thus far the Committee has only financed the fuel for the tractor. This man co-operated in a very fine way and has made an excellent job of the summerfallow to date. It was the intention to summerfallow this infested area on this farm two years in succession but the Committee are considering cropping about half of this summerfallow area in 1940 and harvest plowing it and then summerfallowing it again in 1941. The balance will be summerfallowed again in 1940. The reason for this change in procedure is due partly to the hazard of soil drifting from two years continuous summerfallow and partly to determine if one year's good summerfallowing, followed by the cropping and harvest plowing with continuous summerfallowing again, will control Leafy Spurge. If it will, it may offer a solution to the Leafy Spurge problem in areas where infestation is much worse than in this area.

The second application of chemical was commenced on Sept. 21st and completed on October 12th,1939. In the second application quite a few more patches of Leafy Spurge were treated than at the time of the first application and quite an extensive infestation of Field Bindweed was discovered in the R.M. of Miniota. The smaller patches of Field Bindweed were treated in the second treatment with a solution of two lbs. of Atlacide to one gallon of water, giving it a thorough saturation. In the case of two farms, tillage methods will be necessary because of the bad infestation of field Bindweed. In the case of one farm with 200 acres under cultivation and practically all of it infested with Field Bindweed, the Committee is recommending that 50% of the land be summerfallowed each year and harvest plowing be done and the land kept black for the remainder of the year. In this way the land is almost continuous summerfallow, excepting for the time the crop is growing on the land every other year. We feel that this method may prove a solution to bringing bad infestations of Field Bindweed and Leafy Spurge under control.

In the second application Leafy Spurge was treated on 22 farms in ten Municalities and Field Bindweed was treated on six farms in the Municipality of Miniota, a total of almost 16,500 lbs. of chemical used in the two applications in 1939 in the Northern Judicial district of Manitoba. The two spraying outfits for both applications were employed a total of 609.15 hours which was at the average rate of 27 lbs. of chemical per hour. This included moving and travelling time. etc. They actually averaged about 50 gallons of solution per hour when working continuously on patches without too much moving. Each outfit was paid $1.00 per hour for truck and two men plus gasoline and oil and living expenses. In most cases the farmers boarded the men while on their job and were expected to supply an extra man and haul the water. In some cases the co-operation was not all that could be desired but in many cases was exceptionally good. In two cases there was no co-operation whatsoever from the farmer. The total cost for labor for applying chemical was $864.94 which is about 5.2 cents per pound of chemical used. The chemical cost a little more than 8 cents per lb., making a total cost for chemical and labor of under 14 cents per lb.

In addition to these costs of labor and chemical it was necessary to pay Mr. Reeve W.C.Wroth's travelling expenses for interviewing the R.M.Councils and Town Councils in the Northern Judicial Dist. and as a result of his work $750.00 has been collected to date. This involved over 1,200 miles of automobile travel by Mr. Wroth and in one case he visited four Councils in one day.

In addition to these expenses, the Committee authorized the payment of $150.00 to Mr. John Chapman for his summerfallow work,which was approximately the cost of fuel.

Thus far, the total expenses for the first year's campaign is just a little over $2,500.00. When one considers the area covered, which is quite a goodly pro - portion of Manitoba, and the number of farms affected, this expenditure can be considered a very profitable investment for all concerned.

It must be borne in mind that there is a good deal of volunteer effort by a number of individuals which has not been charged up to this campaign. Mr. Lorne Carter, Dist. Agriculturist, Russell, was active throughout the campaign and personally supervised all of the work in the Municipality of Russell. The writer supervised most of the rest of the work including the original survey, making three trips to Winnipeg meetings, and took the local Committee to Brandon twice, once in the spring and once in the fall to go over the experimental plots in Leafy Spurge control work conducted by Brandon Experimental Farm. The campaign methods employed in this project are based largely on the results of work performed by Brandon Experimental Farm. Altogether, the writer believes that he travelled upwards of 7,000 miles in this Leafy Spurge control work, all of his expenses and time being paid by the Colonization Finance Corporation.

On the whole, our Committee is well pleased with the results of the first year's work. We plan to make a third application, probably in June, 1940, treating all of the patches again, using the same strength of solution, namely one lb. of Atlacide to one gallon of water and applying only half as much solution, namely, 50 lbs. of solution to 100 square feet. The cost of the campaign in 1940 should be about half of our total costs in 1939 unless additional patches of Leafy Spurge and Field Bindweed are discovered. It will also be necessary to carefully follow up this work for several years and all surviving plants treated. This work will have to be carefully done and thoroughly carried out, otherwise much of the good work already done will eventually be lost. We feel confident that we can completely eradicate Leafy Spurge and Field Bindweed from the Northern Judicial District which consists of 17 Municipalities at a total cost of something under $5,000.00 which is about the value of a fair half section of land in the area under discussion. Had the work been delayed five years, the cost of complete eradication would have been prohibitive and some farms would eventually have been abandoned.

Possibly the greatest benefits accruing from this work at this stage is the fact that most of the people living in this Northern Judicial District have now heard of Leafy Spurge, many hundreds have seen and can now identify Leafy Spurge that never knew there was such a weed one year ago. In fact, it has helped to make people over the entire area weed conscious. It has also demonstrated the many advantages in weed control of groups of Municipalities working together as a unit and may lead the way to a complete change in weed control work so far as Rural Municipalities are concerned.

T.L.Townsend, Farm Manager
Colonization Finance Corporation
of Canada Limited.

CEREAL COMMITTEE

Recommendations Presented by D.M. McLean

Whereas the soil survey in Manitoba has progressed to the point where the boundaries of the soil Climatic Zones are fairly definitely established, it is felt that we, the Manitoba Agronomists, should adopt as a basis of cereal recommendations a map based on the soil zones of Manitoba as published in the "Soils of Manitoba" by Professor J.H.Ellis, September, 1938.

And furthermore since the nomenclature used on the present Western Cereal Zonation Map, while designed to describing the whole western region, is somewhat confusing for use within Manitoba, where the soil climatic zones are numerous and diverse, a nomenclature giving a definite sequence of numbers and letters is required.

It is therefore recommended that for use within the province the nomenclature be changed to conform with that outlined on the new map attached.

WHEAT - Recommended Varieties

The rust-resistant varieties of Regent, Renown and Thatcher are recommended for all of the wheat-growing areas.

Renown (R.L.716) - Developed at the Dominion Rust Research Laboratory from the cross H-44 x Reward. Spike beardless with short awnlets at the tip, lax. Glumes (chaff) white and smooth; kernels red. Spikelets inclined to be zig-zag in arrangement. Straw of medium length and moderately stiff, sometimes tinged with purple at maturity. Three days earlier than Marquis. Resistant to stem rust and bunt; moderately resistant to leaf rust and loose smut. Yields less than Thatcher when leaf rust is not a factor but more than Thatcher when leaf rust attack is severe. Satisfactory milling and baking quality. Somewhat susceptible to spring frosts.

The present Foundation Stock, Elite Stock and Registered Seed of Renown are of an improved strain (R.L. 716.6). This strain excels R.L.716 in yield, strength of straw, leaf rust resistance and baking quality.

Regent (R.L.975.1) - Developed at the Dominion Rust Research Laboratory from the cross H-44 x Reward. Spike Beardless with short awnlets at the tip, lax. Chaff white and smooth; kernels red. Spikelets inclined to be zig-zag in arrangement. Straw of medium length and moderately stiff, white. Four days earlier than Marquis. Resistant to stem rust, leaf rust and bunt; moderately resistant to loose smut. Yields somewhat more than Renown and approximately the same as Thatcher. Good milling and baking quality.

Thatcher - Developed at the University of Minnesota from the cross (Marquis x Iumillo) x (Marquis x Kanred). Spike beardless with short awnlets at the tip, dense. Kernels red and usually somewhat dull in colour. Chaff white and smooth. Straw of medium length and strong, white. Four days earlier than Marquis. Resistant to stem rust and loose smut. Susceptible to leaf rust and bunt. High yielder, except under severe leaf rust conditions. Good milling and baking quality.

For those wishing to grow Durum Wheat, Mindum is the variety recommended.

Varieties not recommended - Coronation, on account of poor milling quality. There are several unlicensed wheats being grown to a limited extent which are definitely inferior. Manitoba Agronomists do not recommend the growing of unlicensed varieties. Of the new American rust-resistant wheats, Pilot and Rival (not licensed in Canada), Pilot is definitely weak in the straw and while Rival shows some promise it is prone to shattering and further tests are desirable before this committee can make recommendations.

OATS - Recommended Varieties

Vanguard - rust-resistant oat for all zones.

Anthony - partial resistance, recommended for Zones 3,4A & 4B.

Gopher - useful in Zones 1, S½ of 2A, 2B and 2C.

Where seed of the above varieties is not available the following may be used: Victory and Banner for all zones.

Varieties not recommended - Green Russian on account of yellow color. Cartier on account of low yield.

BARLEY - Recommended Varieties for Malting Purposes

O.A.C.21 and Mensury Ottawa 60 - generally recommended for the whole province.

Gartons and Peatland are rust-resistant types. Gartons is adapted for late seeding and is recommended for this purpose although it is very weak in the straw. Peatland is a variety possessing some merit on account of its rust-resistance and strong straw but is not generally recommended due to its low yield and susceptibility to drought conditions.

Mensury Ottawa 60 and Gartons are eligible for the malting grades - 1CW and 2CW 6 row (Grain Act Amendment 1939). After July 31st, 1940, Peatland will not grade higher than 3Cw 6 row (Regulation Board of Grain Commissioners).

Recommended for Feed Purposes - Wisconsin 38 which has given higher yields under Manitoba conditions, is recommended for Zones 1, 2A, 2B, 2C. Wisconsin 38 at present would qualify for the 3CW 6 row grade that is provided in the Grain Act Amendment 1939.

Plush - a high-yielding, smooth-awned, newly licensed variety is being distributed this year and appears to hold promise for the south.

Varieties not recommended - Olli on account of low yield. Regal on account of susceptibility to rust. Two new varieties recently licensed -- Rex, a smooth-awned, two-rowed type not recommended on account of susceptibility to rust, and Prospect, an early smooth-awned, six-rowed, drought resistant type - needs further testing here.

Note: That area included in Zones 1 and western portions of 2B and 2C is not considered a satisfactory area for growing of malt barley

FLAX - Recommended Varieties

Bison - recommended for Zones 1,2A,2B,2C or south half of province.

Redwing -on account of its earliness is recommended for Zones 3,4A, 4B,5,6 and 7. In general for the north half of the province.

Royal-yielding well in tests and recommended for south half of prov.

Not Recommended -Crown & Premost-susceptible to wilt. Buda & Linota -small seed size. Golden-weak straw.

Recommended Varieties - Spring Rye: Prolific for all zones.
Fall Rye: Dakold for all zones.

FIELD BEANS - Golden Vine, Early Blue & Chancellor for all zones.

PROVINCE OF MANITOBA
(SOUTHERN PORTION)

SOIL—CLIMATIC ZONES
Legend
(Prevailing Soil Type)

1. Brown-Black Transition
2A. Black Earth—Heavy Textured
2B. Black Earth—Light Textured
2C. Black Earth—Medium Textured
3. Northern Black
4A. Grey-Black (Gilbert Plains)
4B. Grey - Black (Swan River)
5. Grey-Black and Grey-Wooded
6. Grey-Wooded
7. High Lime

37
33
28
19

SWAN RIVER
MINITONAS
Swan River
4B
7
6
LAKE WINNIPEGOSIS
LAKE MANITOBA
ETHELBERT
MOSSEY RIVER
LAWRENCE
DAUPHIN
LAKE DAUPHIN
Dauphin
SHELL RIVER
HILLSBURG
GRANDVIEW
GILBERT PLAINS
4A
SHELLMOUTH
BOULTON
OCHRE RIVER
STE. ROSE
7
RUSSELL
SILVER CREEK
ROSSBURN
6
MCCREARY
ELLICE
BIRTLE
SHOAL LAKE
STRATH-CLAIR
HARRISON
CLAN-WILLIAM
ROSEDALE
GLENELLA
2B
3
LANSDOWNE
WEST-BOURNE
LAKE-VIEW
MINTO
ARCHIE
MINIOTA
HAMIOTA
BLANSHARD
SASK
ODANAH
LANGFORD
WALLACE
WOODWORTH
DALY
ELTON
NORTH CYPRESS
NORTH NORFOLK
2C
2B
Virden
Portage la Prairie
PIPESTONE
SIFTON
WHITEHEAD
CORNWALLIS
Brandon
SOUTH CYPRESS
VICTORIA
SOUTH NORFOLK
ASSINIBOINE R.
GLENWOOD
OAKLAND
Souris
2B
2C
ALBERT
CAMERON
WHITEWATER
RIVERSIDE
STRATHCONA
ARGYLE
LORNE
5
EDWARD
ARTHUR
BRENDA
WINCHESTER
MORTON
1
5
TURTLE MOUNTAIN
ROBLIN
LOUISE
PEMBINA
2C
SIGLUNES
FISHER BRANCH
WOODLEA
CHATFIELD
BIFROST
ERIKSDALE
7
KREUZBERG
GIMLI
COLDWELL
ARMSTRONG
VICTORIA BEACH
LAKE WINNIPEG
ST. LAURENT
ROCKWOOD
WOODLANDS
ST. ANDREWS
ST. CLEMENTS
LAC-DU-BONNET
BROKENHEAD
PORTAGE LA PRAIRIE
WHITE-MOUTH
ROSSER
CARTIER
SPRINGFIELD
GREY
MACDONALD
2A
TACHE
BIRCH RIVER
RICHOT
STE. ANNE
DUFFERIN
HANOVER
MORRIS
RED R.
DE-SALASBERRY
LA BROQUERIE
7
THOMPSON
ROLAND
STANLEY
Morden
RHINELAND
MONT-CALM
FRANKLIN
Emerson
STUARTBURN
PINEY
SPRAGUE

*Disorganized

Observations reported by Regent Wheat Growers, 1939.

By Dr. L.H. Newman, Dominion Cerealist, Ottawa.

Over 2,800 farmers in Manitoba and Saskatchewan sowed 4,000 bu. Regent wheat in the spring of 1939, in order that they might compare this promising new variety with the other varieties which they were growing. Many of these people already had Thatcher and quite a percentage also had Renown and Apex.

A questionnaire was sent to each of these growers during the autumn of 1939, and of these, 918 have been returned to date. Quite a number of those reporting stated that they had received Regent a little late so that the results obtained were hardly comparable with those obtained from the other varieties sown at a normal time. This placed Regent at a disadvantage especially since late sown wheat suffered more in 1939 than did that sown earlier.

The observations reported under the different headings considered, are dealt with below:

1. General Yield: Generally speaking, it would seem safe to say that Regent gave an excellent account of itself from a yield standpoint, although comparable yields were not obtained in all cases.
2. Grasshoppers: Approximately one hundred growers made what appear to be reliable observations as to the ability of Regent and other varieties to resist grasshopper attacks. These indicate quite clearly that Regent and Thatcher are both better than Renown, Reward or Marquis in this respect. Thatcher would seem to be a little better than Regent.
3. Stooling Capacity: Regent has been widely acclaimed as a vigorous stooler and one which covers the ground well early in its growth. This characteristic, it is believed, should make this avriety a valuable combatter of weeds. Quite a number stated that the stooling ability of Regent enabled it to recover relatively well after a severe "blow".
4. Straw Strength: A large number of growers found Regent particularly strong especially towards the base of the plant but many thought that the stem lacked the flexibility of Thatcher towards the top. Hail inspectors commented on the smaller damage by hail done to Thatcher than to any other variety involved. Many looked upon Regent as a very promising wheat from a combine standpoint.
5. Quality of Sample: Regent seemed to suffer rather more severely than did Thatcher under very dry ripening conditions. Thatcher, however, deteriorated more quickly than Regent in colour, under adverse conditions. The grain of Regent when shrunken split more readily during the process of threshing than did Thatcher or Renown. Apex and Renown probably stood weathering in the stook better than either Thatcher or Regent. The general appearance of the grain of Regent was better than Thatcher but not equal to Renown. Many thought that the season of 1939 was particularly unfavourable to Regent and that under less trying conditions, it would present a better appearance. This was particularly true along the southern parts of the three Provinces.
6. Twine Used: Quite a number referred to the more leafy appearance of Regent. They believed that this probably explained why this variety took more twine than either Thatcher, Apex or Renown.
7. Threshing: Judging from the observations made by quite a number of growers, Regent under normal conditions seemed to thresh quite easily.

8. Resistance to Spring Frosts: Quite a substantial number of growers reported that Thatcher stood the early June frosts which occurred in many localities, better than any of the other varieties on which observations were made. Regent also came in for many favourable comments in this regard but Renown was criticized quite definitely.

9. Future Outlook: Judging from the statements made by our correspondents, it seems safe to conclude that Regent will be grown very extensively in 1940, especially in some districts, as it has established an excellent reputation and seems to have convinced a lot of people that it has a very definite future. Its remarkable ability to establish itself quickly in the spring and thus be in a better position than most varieties to combat disease and soil drifting, has been highly commended.

New Rust-Resistant Wheats Produced in the United States

By R. F. Peterson.

Two new rust-resistant spring wheats were released for commercial growing in the United States in 1939, namely, Pilot, developed by the United States Department of Agriculture, and Rival, produced by the North Dakota Experiment Station. A number of other new wheats under test in the United States have been named. Six of these American varieties were included in the Co-operative Tests grown in Western Canada in 1939. The purpose of this report is to summarize the results of these six varieties in tests in Manitoba in comparison with a number of standard varieties which are grown commercially in this province.

Table 1 shows the origin of the various wheats. Five of the American varieties (and probably the sixth) have been derived from one of the two disease-resistant wheats, Hope and H-44. To develop Premier, for example, Hope and Florence were crossed and a disease-resistant selection obtained which was then crossed with Ceres; and a selection from this combination was next crossed with R.L.625 which is a wheat developed at the Dominion Rust Research Laboratory from Double Cross x Ceres.

Table 2 shows the yields of varieties at six points in Manitoba in 1939. As Rival was tested in 1938 and 1939, the average yields of that variety at various stations for two years are shown in Table 3. The new American varieties were, on the average, rather similar in yield. They yielded, on the whole about the same as Regent, but more than Renown or Apex. In 1939 the yield of Thatcher was practically the same as that of the newer varieties but in 1938 its yield was reduced by leaf rust.

Table 4 summarizes the yield dats obtained in 1939 for six varieties at twenty points in Manitoba. Rival is included in this set. It gave practically the same yield as Thatcher and a higher yield than any of the other four varieties.

Table 5 gives a summary of a number of agronomic characteristics. The new wheats are somewhat later maturing than the standard Manitoba varieties. In strength of straw Premier and Merit appear to be satisfactory, Rival and Mercury fair, and Pilot poor. No numerical data on shattering were taken in Manitoba but records of the Winnipeg test show that Rival, Mercury and Premier exhibited some shattering. These observations are confirmed by

data from Saskatoon which appear in Table 5.

Table 6 shows the disease reactions of varieties in 1939. All the new varieties are highly resistant to stem rust although Rival possesses the least resistance of this group of wheats.

No data on the milling and baking qualities of Canadian-grown samples of these wheats are yet available except for samples of Rival grown in 1938, and these gave satisfactory results.

TABLE 1: The Origin of Rust-Resistant Wheats.

Variety	C.T.* No.	Developed by	Cross
Pilot	604	U.S.D.A.	Ceres x Hope
Merit	605	U.S.D.A.	H-44 x Ceres
Rival	803	N.D. Exper. Sta.	Ceres x (Hope x Florence)
Mercury	804	" " "	" " "
Premier	805	" " "	(Ceres x (Hope x Florence) x R.L. 625
Carleeds	904	Carl Nordhaugen, Leeds, N.D.	Unknown
Thatcher	501	Minn. Exp. Sta.	(Marquis x Iumillo) x (Marquis x Kanred)
Renown	106	Dom. Rust Lab.	H-44 x Reward
"	131	" " "	" "
Regent	124	" " "	" "
"	135	" " "	" "
Apex	304	U. of Sask.	(H-44 x D.C.) x Marquis
"	309	" "	" " "

*Co-operative Test Number.

TABLE 2: Yields at Manitoba Stations* - 1939.

Variety	C.T. No.	Wpg.	Ptge.	Bran.	Mord.	Gil. Pls.	Swan River	Average
Pilot	604	36.5	37.5	40.8	30.8	38.4	47.8	38.6
Merit	605	35.3	42.2	40.2	34.5	35.7	48.8	39.4
Rival	803	33.4	38.2	46.5	30.5	43.6	49.5	40.3
Mercury	804	31.0	41.0	44.9	33.5	38.3	46.4	39.2
Premier	805	34.6	39.3	45.5	36.5	37.0	49.9	40.5
Carleeds	904	36.2	38.7	43.1	34.4	37.2	46.1	39.3
Thatcher	501	27.6	40.3	47.8	37.4	41.1	45.3	39.9
Renown	106	29.3	40.1	36.1	25.6	35.4	45.9	35.4
"	131	32.0	36.2	43.1	31.2	37.0	46.7	37.7
Regent	124	32.0	38.1	48.7	32.3	39.4	49.5	40.0
"	135	30.2	38.5	46.4	40.4	37.2	47.6	40.0
Apex	304	27.9	33.4	40.3	28.8	40.2	47.6	36.4
"	309	31.0	33.8	34.9	30.8	39.5	40.8	35.1
Marquis	1	25.6	23.8	28.7	27.2	35.6	39.2	30.0

*The stations are Winnipeg, Portage la Prairie, Brandon, Morden, Gilbert Plains and Swan River.

TABLE 3: Average Yields for Two Years at Manitoba Stations, 1938-1939.

Variety	C.T. No.	Wpg.	Ptge.	Bran.	Mord.	Gil. Pls.	Swan River	Average
Rival	803	30.8	42.2	46.3	36.1	38.0	45.4	39.8
Thatcher	501	22.8	36.8	46.8	33.9	35.9	41.1	36.2
Renown	106	24.8	41.5	41.8	29.3	33.9	42.6	35.6
"	131	28.0	41.8	46.9	32.0	33.5	45.6	38.0
Regent	124	29.0	43.5	48.6	34.9	39.8	44.8	40.1
"	135	28.0	43.6	47.6	39.4	33.8	43.2	39.3
Apex	304	22.8	31.7	39.8	29.7	34.6	38.3	32.8
"	309	24.3	31.8	39.8	31.8	34.8	37.5	33.3
Marquis	1	15.3	19.6	22.2	22.4	28.4	27.8	22.6

TABLE 4: Average Yields for Six Wheat Varieties from Supplementary Tests at Twenty Points in Manitoba.

	Variety					
	Regent	Renown	R.L. 1334	Apex	Thatcher	Rival
Yield	26.9	25.6	26.3	25.0	30.0	30.1

TABLE 5: Summary of Agronomic Characteristics of Varieties.

Variety	C.T. No.	Yield[1]	Days to Ripen[2]	Strength of Straw (1-10)[3]	Height Inches[4]	Shattering %[5]	Awn Condition
Pilot	604	38.6	100	6.5	40	0.2	Awned
Merit	605	39.4	99	8.2	40	0.8	"
Rival	803	40.3	100	7.3	42	3.2	"
Mercury	804	39.2	100	7.6	43	7.3	"
Premier	805	40.5	99	8.8	43	10.8	"
Carleeds	904	39.3	99	7.9	42	1.7	Apical awnlets
Thatcher	501	39.9	98	8.7	40	0.2	" "
Renown	106	35.4	98	8.6	41	1.5	" "
"	131	37.7	98	9.1	41	0.2	" "
Regent	124	40.0	97	8.3	41	0.0	" "
"	135	40.0	96	8.9	40	0.7	" "
Apex	304	36.4	100	7.2	40	0.2	" "
"	309	35.1	99	7.1	41	1.3	" "
Marquis	1	30.0	101	8.1	42	0.3	" "

1. Average from 6 stations in Manitoba.
2. " " 5 " " "
3. " " 5 " " "
4. " " 5 " " "
5. Data from Saskatoon. Average of 6 Replications.

TABLE 6: Reactions of Varieties to Diseases - 1939.

Variety	C.T. No.	Stem Rust %	Leaf Rust %	Bunt %		Loose Smut %	Black Chaff %	Root Rot %
				T. tritici	T. laevis			
Pilot	604	4	12	15.2	11.9	35.9	3	24.2
Merit	605	1	11	24.9	4.9	38.3	0	24.1
Rival	803	7	11	25.0	7.6	0.0	2	21.7
Mercury	804	3	4	21.0	2.1	0.0	2	23.6
Premier	805	2	2	13.0	2.2	0.7	1	18.7
Carleeds	904	6	32	2.9	0.5	50.7	2	23.4
Thatcher	501	1	35	16.9	17.4	0.0	2	20.4
Renown	106	2	20	5.9	0.2	14.8	6	21.0
"	131	2	2	4.4	0.1	0.7	2	25.8
Regent	124	1	16	4.0	2.0	34.3	7	26.2
"	135	2	12	15.4	7.9	55.6	7	24.2
Apex	304	1	35	14.0	6.6	33.6	12	18.7
"	309	1	20	16.8	9.5	22.6	11	22.6
Marquis	1	38	35	15.2	15.5	75.6	0	23.8

PROGRESS REPORT ON THE PRODUCTION OF EARLY MATURING OAT VARIETIES

The performance, over a five-year period, of an early maturing rust-resistant oat strain, No. 85, which is a sister strain of Vanguard, is compared with that of Gopher, which is also early maturing, as well as with Vanguard which is medium early maturing and Rusota, Anthony and Banner which are late maturing varieties. A more recent strain, No. 1114, which is from a Victory x Hajira cross, is compared with 85 and Gopher with respect to tests that were conducted in 1939 only. The data are given in Tables 1, 2, and 3.

Table 1 gives the average yields at Winnipeg, Morden, Brandon and Gilbert Plains during the five-year period, 1935-1939. The data show that the early varieties, 85 and Gopher, were higher yielding at Morden than the later maturing ones and that 85 was superior to Gopher at the four stations. Strain 85 and Vanguard gave the highest average yields for all four stations.

Table 2 gives the average number of days to maturity, strength of straw, height, weight per bushel, weight per 1,000 kernels, per centage of hull, and yield for all stations at which tests were conducted during the five-year period, 1935-1939. The data show that both Gopher and 85 are from five to six days earlier than the later maturing varieties and that they are stronger in the straw. Strain 85 is taller than Gopher, although both varieties are shorter than Rusota, Anthony and Banner. There is little difference between these two varieties in size of kernel although both of them are smaller in this respect than the other four varieties. Strain 85 and Gopher differ considerably, however, with regard to hull content, the former variety possessing three per cent more hull than Gopher. Gopher, Vanguard and Rusota are equally low in hull content, while 85, Anthony and Banner are equally high.

In Table 3, Gopher and strains 85 and 1114 are compared. The results are the average of nine tests conducted in 1939, and although they are for one year only the data show that 1114 is quite promising, as it a ppears to be stronger in the straw and higher yielding than either 85 or Gopher.

TABLE 1: Average yields of six oat varieties at four co-operative stations during the five-year period, 1935-1939.

	Stations				
Varieties	Winnipeg	Morden	Brandon	Gilbert Pls.	Averages
85	64	75	84	58	70
Gopher	55	69	76	49	62
Vanguard	64	66	80	57	67
Rusota	63	61	69	59	63
Anthony	68	55	74	57	64
Banner	64	47	72	57	60

TABLE 2: Summary of data for six oat varieties grown at all co-operative stations during the five-year period, 1935-1939.

Varieties	Days to Mature	Strength of Straw	Height	Weight per Bu.	Weight per 1,000 K.	% Hull	Yield in Bushels.
85	83	8.2	34	35	23	26	56
Gopher	82	8.1	32	36	22	23	52
Vanguard	86	8.2	34	35	25	23	56
Rusota	88	7.8	35	34	21	23	54
Anthony	89	7.8	35	36	25	26	53
Banner	88	7.7	36	34	25	26	51

TABLE 3: Summary of data for three early maturing oat varieties at nine co-operative stations in 1939.

Varieties	Days to Mature.	Strength of Straw	Height	Weight per Bushel	Yield in Bushels
85	88	7.7	39	34	68
Gopher	87	7.2	37	35	69
1114	87	8.7	40	34	74

DURUM WHEAT BREEDING

at the

DOMINION RUST RESEARCH LABORATORY

Since durum wheat breeding was begun at this laboratory in 1928 approximately 45 crosses have been made. Thirty-three of these crosses were made during the last three years.

The chief aim in this breeding program is to produce, by hybridization, an early maturing, high yielding, disease resistant durum variety having good strength of straw and high quality for the production of macaroni. Other aims include the production of smooth awned or awnless variety and of a winter type of durum wheat.

One of the main difficulties in this program has been to find suitable parental material. None of the commonly known older varieties is early maturing or has satisfactory straw strength. This is indicated in Table 1. It is interesting to note that none of these older varieties has been produced by hybridization.

Up to the present two highly rust-resistant varieties have been produced. These are R.L. 1183, which is an exceptionally high yielder, and R.L. 1317, which is perhaps higher in quality than Mindum. Neither of these has stronger straw than Mindum, and R.L. 1183 is slightly inferior in quality. Both are slightly earlier than Mindum.

There are under test 23 pure line selections of R.L. 1183, some of which appear to be agronomically superior to the original strain. These lines have not yet been tested as to quality. Pure line selections of R.L. 1317 will be included in the rod row tests in 1940.

Table 11 gives a summary of results of 15 durum varieties and Thatcher as obtained from the 1939 durum co-operative test at 4 Manitoba stations. Tables 111 and 1V give results of yield of the 16 varieties for 1939 and for selected varieties for a 3-year period.

TABLE I.

VALUE OF OLDER DURUM VARIETIES AS PARENTAL MATERIAL

Variety	Stem Rust	Bunt	Maturity	Kernel Color	Straw	Macaroni Quality	Yield	Rating / Percent
Mindum	Susc.	Susc.	Late	Amber	Fair	Excellent	Good	65
Arnautka	"	"	"	"	"	Good	Fair	53
Pellissier	"	Res.	V. Late	"	"	Fair	"	53
Akrona	"	Susc.	Med. Early	"	"	"	"	53
Kubanka	"	"	Late	"	"	"	"	47
G. Ball	"	Res.	"	"	" *	V. Poor	"	47
Monad	M. Res	Susc.	"	"	"	Poor	"	41
Nodak	"	"	"	"	"	"	"	41
Acme	"	"	"	"	"	"	"	41
Iumillo	Immune	"	"	Red	Poor	Fair	Poor	41
Pentad	Res.	"	"	"	"	Poor	Fair	29
I X M 1317	H. Res.	"	"	Amber	Fair	Excellent	Good	88
I X M 1183	H. Res.	"	"	"	"	Good	"	82

* Solid stem

/ An estimate of the value for breeding material based on the characters as given in the table.

TABLE II

Variety	R.L. No.	Days to Head	Days to Mature	Stem Rust	Height	Straw Strength	Yield
Mindum	1344	62.2	96.4	18.7	46.5	7.4	33.4
Arn.	570	64.2	98.2	19.1	46.6	7.2	30.2
Peliss.	1489	64.5	96.9	23.6	43.6	7.1	27.8
Kub.	219	63.0	96.3	16.4	45.2	7.8	30.6
That.	1246	57.8	92.0	2.3	38.6	9.2	34.2
I X M	1183	61.0	96.3	0.2	43.3	6.6	36.0
(M-P)XM	1491	61.0	96.0	9.7	44.2	6.8	33.0
I X M	1317	60.0	96.5	0.2	42.8	6.2	33.5
I X M	1608	64.6	96.8	0.1	41.8	7.2	33.8
Act Kub.	1601	61.4	96.2	5.0	42.6	7.1	30.4
I X M	1611	61.0	95.4	1.9	42.7	6.5	33.8
"	1619	61.0	96.0	0.1	43.8	6.2	31.3
"	1617	64.3	97.6	0.5	42.2	7.5	29.8
"	1620	56.0	95.0	0.3	43.6	6.8	30.8
M X B.P.	1603	65.0	97.3	3.5	40.0	6.4	31.7
M X P	1616	64.4	97.7	5.5	40.6	6.9	30.0

TABLE 111

DURUM CO-OP TEST MANITOBA STATIONS YIELD 1939

Variety	R.L.No.	Winnipeg	Morden	Melita	Brandon	Mean All Stations
I X M	1183	33.5	31.3	37.3	42.1	36.0
Thatcher	1246	33.0	33.6	28.9	41.5	34.2
I X M	1608	31.9	26.2	34.8	42.3	33.8
I X M	1611	35.5	28.5	27.8	43.2	33.8
I X M	1317	28.7	31.3	29.3	44.6	33.5
Min.	1344	19.0	28.9	37.5	48.3	33.4
(M-P)X M	1491	28.9	28.7	32.3	42.3	33.0
M X B.P.	1603	31.0	27.6	32.3	35.9	31.7
I X M	1619	24.7	30.2	28.1	42.2	31.3
I X M	1620	29.9	28.3	23.8	41.2	30.8
Kub	219	25.5	26.2	31.9	38.8	30.6
Ac X Kub	1601	29.6	24.8	28.2	38.9	30.4
A rn.	570	22.6	22.8	35.9	39.6	30.2
M X P	1616	27.9	22.5	35.9	33.7	30.0
I X M	1617	25.0	26.0	29.1	39.1	29.8
Peliss	1489	14.9	26.4	29.5	40.5	27.8
Station Mean		27.6	27.7	31.4	40.9	

TABLE 1V

SUMMARY OF YIELD THREE YEAR AVERAGES 1937-39

Variety	R.L.No.	1937	1938	1939	Mean
Ium X Min.	1183	32.6	34.3	36.0	34.3
Ium X Min	1317	32.4	31.5	33.5	32.5
Mindum	1344	26.5	29.7	33.4	29.9
Thatcher	1246	29.1	26.0	34.2	29.8
Arnautka	570	26.8	27.1	30.2	28.0

Report on New Barley Varieties

By W. H. Johnston,

During the past few years several smooth awned barley varieties have been licensed for distribution in Canada and while these have been tested at a number of points in the Prairie Provinces, no comprehensive report on their behaviour has been presented to the Manitoba Agronomists. This summary is intended to supply a portion, at least, of this information. The data given in tabular form were taken from a summary of "Uniform Barley Trials" prepared by the Cereal Division, Central Exp. Farm, Ottawa, for the National Barley Committee. A number of rough awned standards have been included for comparative purposes.

General remarks with reference to origin and adaptability of these new smooth awned varieties follows:

Newal - Developed at the University of Alta. from the following combination of crosses - (Manchurian x Lion) x O.A.C. 21. This variety is largely cultivated in central Alberta where it has given very satisfactory yields of heavy grain. It has been noted to possess some tolerance to stem rust and, for this reason, should perhaps be receiving more attention in Manitoba than it is at present.

Nobarb - Developed at the O.A.C., Guelph, from a cross between O.A.C. 21 x Lion. Nobarb is not grown to any extent in the West and is not likely to become popular in Manitoba on account of its weak straw and susceptibility to stem rust.

Prospect - This variety was recently licensed by the Dominion Experimental Station at Swift Current, and was selected out of a natural cross between Albert x Lion. According to authorities at the Swift Current Station, Prospect has the advantages of early maturity and superior yielding ability under drought conditions. It does not appear to be so well adapted to more moist regions of the West. The variety may have a place in the South-west corner of Manitoba but considerable testing will be necessary to establish this assumption.

Regal - Developed at the University of Sask. out of the cross, Lion x Manchuria and has become the standard smooth awn for Sask. It is characterized by stiff straw, good yield, and satisfactory bushel weight. Regal exhibits greater tolerance to drought than Wisconsin 38. Extreme susceptibility to stem rust renders it a hazardous barley for Manitoba.

Wisconsin 38 - Introduced from the Agric. Exp. Station, Madison, Wis., and may be considered as the standard smooth awn for Man. Wisconsin 38 has given high yields of grain and straw and is damaged less by stem rust than other commonly grown types. It may be faulted for being late maturing and displaying some weakness of straw as well as for a tendency toward shattering.

Rex - A two-rowed, smooth awned type developed by the University of Sask. and expected to replace the rough awned Hannchen. Compared with the latter, Rex has averaged two to three days earlier, two inches taller, stronger in straw and equal in yield and bushel weight. Like Regal, it is highly susceptible to stem rust, and therefore not suited to Manitoba conditions.

Plush - Developed at the Dom. Exp. Farm, Brandon, from a cross between "Lion" and "Bearer" and was licensed for distribution in the spring of 1939. It has two main virtues; outstanding yielding

ability, and non-shattering properties. Being recommended as a feed type, Plush is expected to compete with Wisconsin 38 and Trebi.

Compared with Trebi, Plush has the advantages of smooth awn, four inches greater length of straw, higher bushel weight, somewhat better straw strength, and slightly higher yield. Compared with Wisconsin 38 it can be said to excel in yield and straw strength and, what is more important, it is very much less prone to shattering.

Agronomic Comparisons of Some Smooth Awned Barley Varieties

Yield and Yield in % of O.A.C.21 for Each Station Year in Prov.

	Manitoba			Saskatchewan			Alberta		
	Sta. Yrs.	Yield Bus.	Yield % OAC 21	Sta. Yrs.	Yield Bus.	Yield % OAC21	Sta. Yrs.	Yield Bus.	Yield % OAC 21
Newal	17	46.2	112.1	19	26.7	127.8	19	64.6	115.6
Nobarb	17	43.6	105.8	19	26.0	124.4	19	62.3	111.4
Plush	15	49.8	124.5	19	30.7	146.9	19	64.4	115.2
Prospect	17	44.0	106.8	19	29.1	139.2	19	56.3	100.7
Regal	17	43.8	106.3	19	26.6	127.3	19	59.2	105.9
Wis. 38	17	46.3	112.4	19	27.4	131.1	19	56.2	100.5
Rex	11	43.3	106.4	12	25.4	138.0	11	50.7	96.6
Hannchen	16	44.6	105.1	19	29.7	142.1	19	64.9	116.1
Trebi	17	47.4	115.0	19	32.6	156.0	19	67.6	120.9
O.A.C.21	17	41.2	100.0	19	20.9	100.0	19	55.9	100.0
O.A.C.21	15	40.0	100.0	12	18.4	100.0	11	52.5	100.0
O.A.C.21	11	40.7	100.0						

Promising New Barley Hybrids

By H. C. Laidlaw and W. H. Johnston.

This report covers tests of one group of hybrids produced by the Division of Plant Science, University of Manitoba, and another produced by the Dominion Experimental Farm, Brandon. The former are the result of crosses between Peatland and O.A.C. 21 made for the purpose of producing an improved rust resistant barley. The latter have smooth awned varieties among their parentage. The hybrids in both groups are promising selections based upon thorough rust tests, preliminary yield tests and in the case of the University of Manitoba hybrids, malting tests.

The data presented herewith are for the season of 1939 when thirteen of these hybrids were grown at 7 stations. These stations are Fort Garry (University of Manitoba), Portage la Prairie, Brandon, Newdale, Roblin, Ochre River and Bowsman. These tests were conducted jointly by the Brandon Experimental Farm, and Division of Plant Science. The summarized data are presented in the accompanying table. Each column represents the mean for the respective characters for all stations. The O.A.C. and Peatland hybrids (Plant Science) are designated by the Letters U.M. preceding the nursery numbers, and the Brandon hybrids by "Br". The varieties Wisconsin 38, O.A.C. 21 and Peatland were grown as checks.

It will be noted that all the hybrids surpass Peatland in yield although not by a significant figure except in the case of 3 of the Brandon hybrids and U.M. 41. Most of them surpass O.A.C. 21.

The column for "%Rust" gives little information because there was little or no rust at any of the stations. All of the U.M. hybrids are highly resistant, being fully equal to Peatland.

In the column for strength of straw the hybrids and varieties are rated on the basis of 10 as the optimum. In other words U.M. 41 is the strongest strawed of the list.

The earliest hybrid is U.M. 41 which matured in 88 days; 4 days earlier than O.A.C. 21 and Peatland and 7 days earlier than Wisconsin 38.

The work of the Plant Science Division in Barley Breeding is supported by grants from the Canada Malting Company, Dominion Malting Company, United Grain Growers and Provincial Department of Agriculture.

1939 Summary: MANITOBA PLANT BREEDERS COOPERATIVE BARLEY TESTS

Variety	% Rust	Strength Straw	Days to Mature	Wt.per# M.B.	1000£ K.Wt.	Yield
Wisconsin	6	5.6	95	47.7	33.83	56.3
Brandon 34-60	0	8.3	91	49.7	32.79	55.5
Brandon 3401	t	7.2	92	47.6	30.20	54.1
Brandon 34-8	t	7.4	93	48.4	31.25	52.3
U.M. 41	0	8.8	88	49.1	25.13	52.2
Brandon 34-55	0	5.5	94	48.2	31.83	50.9
Brandon 34-3	t	5.6	93	48.3	28.67	50.7
U.M. 18	0	7.9	91	49.8	29.45	49.9
U.M. 23	0	8.1	90	49.3	30.08	49.9
U.M. 51	0	8.0	92	49.4	30.17	49.7
U.M. 19	0	7.8	91	49.7	29.81	49.6
U.M. 17	0	8.4	90	49.2	30.0	47.8
Brandon 34-9	t	4.9	94	47.3	27.77	44.4
U.M. 31	0	8.3	92	49.1	28.15	43.3
O.A.C. 21	4	6.2	92	46.8	30.13	44.4
Peatland	0	8.0	92	48.8	26.68	42.6

#Wt. per measured bushel. £ 1000 kernel weight. Sig. Dif. - 7.5 bu./ac